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The World's Fair—A Correction.

In our last issue, page 609, appeared a communication from Mr. T. C. Clarke concerning the World's Fair. In the last paragraph he mentioned the striking fact that there are 420 miles of passages in the buildings, and 440,000 separate exhibits. Unfortunately, an error of proof-reading made nonsense of the sentence containing the statement.

Contributions.

What Is a Piston?

BOSTON, Aug. 10, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Persons having acquaintances among railroad men, and who have been brought up in a different school have been struck and considerably puzzled by the use of the words *piston*, *piston-head* and *piston-rod*. Conversation often revealed the fact that when the word *piston* was used a *piston-rod* was meant, and when a *piston* was meant *piston-head* was used. Occasionally the word *follower* is used to denote a *piston*, and I have often found it extremely difficult in railroad shops to convey my ideas on account of this apparent uncertainty in names.

I believe the use of the word *piston* as meaning the rod is seldom if ever heard among designers and builders of stationary engines. It seems to me that the locomotive men are using terms erroneously, and that some effort should be made to bring about correct usage. The word *piston* means the part that fits the bore of the cylinder, and the word *piston-rod* means the part that connects the piston with the cross-head. The dictionaries do not necessarily prohibit the use of the word *piston-head* for piston, but in no case do they sanction the use of the word *piston* for piston-rod. The Century Dictionary in particular gives the word *piston-head* with its obvious definition. While therefore this word is not incorrect, its use should be discouraged, as it is entirely unnecessary. In support of these opinion I give the following definitions taken from the leading dictionaries of the day:

Knight's Mechanical Dictionary.

Piston.—A device so fitted as to occupy the sectional area of a tube and be capable of a reciprocation by pressure on either of its sides. It may be of any shape corresponding accurately to the bore of the tube; but the cylindrical form is almost exclusively employed for both, as in the common pump and the steam engine.

Century Dictionary.

Piston.—A movable piece, generally of a cylindrical form, so fitted as to fill the sectional area of a tube, such as the barrel of a pump or the cylinder of a steam engine, and capable of being driven alternately in two directions by pressure on one or the other of its sides.

Imperial Dictionary.

Piston.—A movable piece generally of a cylindrical form so fitted as to occupy the sectional area of a tube such as the barrel of a steam engine, and capable of being driven alternately in two directions by pressure on, either of its sides.

Webster's Dictionary.

Piston.—A sliding piece which either is moved by or moves against fluid pressure. It usually consists of a short cylinder filling within a cylindrical vessel along which it moves back and forth. It is used in steam-engines to receive motion from the steam, and in pumps to transmit motion to a fluid; also for other purposes.

Worcester's Dictionary.

Piston.—A short cylinder exactly fitting the cavity or bore of a pump or barrel, and working up and down alternately, causing suction.

F. W. DEAN.

Recent Practice in Express Locomotives.

PITTSBURGH, July 17, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The illustrations and description of the Baltimore & Ohio express locomotive, Class I-6, in the *Railroad Ga-*

zette of July 14 are of special interest and value to those connected with, or interested in, the motive power department of railroad service, not merely in their exemplification of the most advanced and approved practice, as applied in a construction evidencing correct and judicious design and proportions and carefully worked out detail, but also as affording a basis of comparison with the equally characteristic example of this general type which is presented in the New York Central's World's Fair express engine No. 999, illustrated in your issue of April 28. It is not my purpose to dissent from, or question the soundness of, the universal commendation which engine No. 999 has received, but only to briefly suggest for consideration the grounds upon which, as it seems to me, the Baltimore & Ohio engine is entitled to recognition, as equally, if not more fully, representing the most recent and most generally accepted features of construction which characterize the American high-speed locomotive.

We have, in both engines, the same cylinder dimensions (19×24) and practically the same cylinder fastenings, valve gear and connections, with the difference of 86-in. driving wheels, spread 8 ft. 6 in. in the New York Central, and 72-in. driving wheels, spread 7 ft. 6 in. in the Baltimore & Ohio engine. It will doubtless be admitted that the larger wheel is exceptional, and that the smaller is not only more fully in accord with prevailing practice, but is better adapted to the conditions of general express train service, which can hardly be properly said to include exceptionally high speeds, over substantially level roads, and with trains not exceeding, say, four or five cars, for which special service the larger wheel may be preferable. Hence, as to the running gear, the two engines may be considered as presenting substantially similar typical features, but it may be noted that engine 999 is provided with truck brakes, a quite recent improvement, while the Baltimore & Ohio engine is not. The spring arrangements are underhung in each case, and that of engine 999 is more nearly in accordance with the usual practice, although that of the Baltimore & Ohio engine seems to the writer to be better located.

Comparing the weights of the two engines, we find engine 999 to have 84,000 lbs. on its driving wheels in a total weight of 124,000 lbs., and the Baltimore & Ohio engine 74,200 lbs. on its driving wheels, in a total weight of 113,700 lbs.; the former thus having slightly more and the latter slightly less than the usual proportion of about two-thirds of the total weight on driving wheels. No material feature of difference is found in this particular, but other things being equal, the lighter engine would be found more generally acceptable.

The only substantial difference in the two engines, and one which immediately impresses the observer, is in their boilers, that of engine 999 being a 58-in. wagon-top, with crown bars, and that of the Baltimore & Ohio engine a 60-in. straight top, with (so-called) radial stays. Disregarding proportions, which do not affect the present consideration, and without desiring to discuss the relative merits of the two types, the boiler of the Baltimore & Ohio engine clearly exemplifies the most recent and most general practice, while that of engine 999 is of a class which has been discarded by most of the leading roads, constitutes only a comparatively small proportion of boilers which are now and have recently been made, and is rapidly going into the category of "back numbers." Mr. Buchanan has produced an excellent boiler of its kind, and given it an unusually large amount of grate area and heating surface, to which the remarkable performance of his engine must be largely due, but it is not the most modern type, and its steam-generating capabilities are equally attainable in the straight top boiler (either radial stay, as in the Baltimore & Ohio engine, or Belpaire top), the adoption of which type has been so general that it may now be reasonably termed "standard," and it is undoubtedly more rightfully entitled to be considered as the representative and characteristic American locomotive boiler of present practice than is that of engine 999, or indeed, any other. Without desiring to disparage the New York Central engine, in any particular, it seems to me that in this, the Baltimore & Ohio engine can be claimed to be of more advanced type and much more fully an example of present practice in the United States.

The grate area of the Baltimore & Ohio engine (23.17 sq. ft.) and total heating surface (1,568.92 sq. ft.) are somewhat less than are ordinarily found in 60-in. boilers having narrow fireboxes, and are considerably exceeded by the corresponding dimensions of the New York Central engine, viz., 30.7 sq. ft. grate area and 1,930.37 sq. ft. total heating surface. This, however, is, as before noted, merely a matter of proportions, which does not in any way depend upon or affect the consideration of the two different types of boilers. While the suggestion may not be directly relevant to the comparison, it seems to the writer that the capabilities of both engines would have been greatly increased by the adoption of a wide firebox.

Each of the engines also exemplifies the most recent practice in a material reduction of smokebox length, as compared with that which has generally prevailed since the adoption of extensions, the New York Central engine being in advance in this particular, with a length of 38½ in. from centre of exhaust pipe to front, while the Baltimore & Ohio engine's corresponding dimension is 46 in. Extensions in separate sheets, formerly 44 in. on this road, were reduced to 36 in., in 19 in. and 20 in.

passenger engines which preceded class I-6, and to 30 in. in the latter engines. From the illustration of the smokebox and spark arrester of the New York Central engine it would seem that the fallacy of the theory that the cinders of a run could be carried in an extension had been recognized, and while no view of the spark arrester of the Baltimore & Ohio engine is given, it will be obvious on inspection that it is substantially similar to that of the New York Central, a smokebox of a length not exceeding 30 in. from centre of exhaust, would, in either case, admit of the use of all the netting area requisite for proper draft, while correspondingly reducing useless smokebox weight and volume.

Both engines have cylindrical or "straight" stacks, in which particular they are not wholly in line with general present practice, which tends to the "taper" or ejector type. The inside diameter of the stack of the New York Central engine is 15¼ in., and that of the Baltimore & Ohio engine is not given. The illustration shows a taper stack, which appears to be about 18 in. outside diameter at throat—or, say, 16½ in. inside diameter. I have, however, recently observed that a "straight" stack of smaller diameter has been substituted, and believe that this is the case on the World's Fair engine of this type. While the steaming qualities of the engine have doubtless been improved by the reduction of throat diameter, it is not apparent why the taper form was not retained in such reduction. The appearance of the engine has also been unfavorably changed, as, by reason of the swell of the base, a plain cylindrical stack has the effect upon the eye of apparently tapering inwardly from throat to top.

It is entirely reasonable, as stated in your description of the I-6 engines, that they should be "undoubtedly among the most successful express engines of the day," and without desiring to make any invidious comparison between them and the New York Central engine, my purpose in this communication has been to present my views as to their full embodiment of all the features of a representative American express locomotive of the present day.

J. SNOWDEN BELL.

An American Railroad Signal of 1832.

Among the interesting exhibits in the exceedingly valuable historical collection shown at the World's Fair by the Pennsylvania Railroad in its building south of the Transportation Annex is a model of a pole-and-ball signal used on the Newcastle & Frenchtown Railroad in 1832; and we are enabled through the courtesy of Mr.

A. Feldpauche, Principal Assistant Engineer of the Philadelphia, Wilmington & Baltimore, to present herewith a sketch of the signal, together with a section of the rails used on the Newcastle & Frenchtown. (Fig. 2.) This road, a part of which is now incorporated in the Delaware Railroad, operated by the Philadelphia, Wilmington & Baltimore, extended from Newcastle, Del., on the Delaware River, westward 15 or 20 miles to Frenchtown, Md., on Chesapeake Bay, and the chief aim in Fig. 2—Rail, operating trains seems to have been to make good connections with the steamboats at each end.

The signals are exhibited at Chicago as "The first block system," and the principle of a space interval between trains certainly was provided for, after a fashion; but we are not so sure but that the conveyance of information to or for the boats was the principal office of the signals, in the minds of those who made and used them.

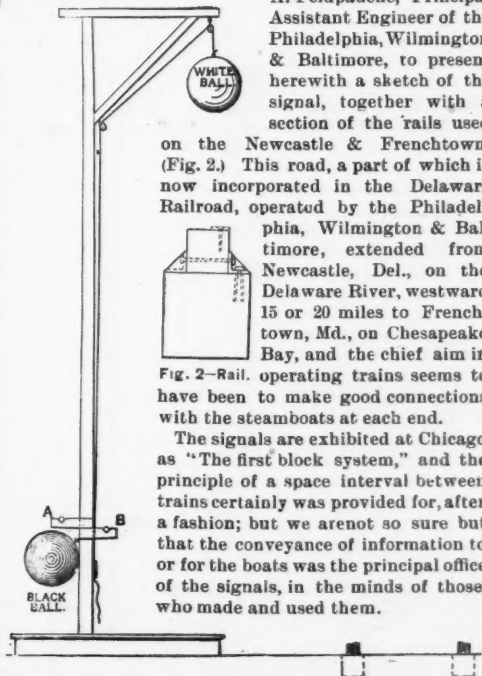


Fig. 1—Signal Used on the Newcastle & Frenchtown Railroad in 1832.

A. B. Guides for Telescopes.

Mr. Feldpauche gives us the following data:

The signals as hereafter described were located as follows: At the beginning of their operation, the one in the New Castle was located on the cupola of the Court House. This one was afterwards, at a date not obtainable, removed to a platform on the end of the gable of the train shed. The next one in order going west was at the crossing of the road leading from Bear Tavern, known then and still as Bear station. The next was at the crossing of the road leading from Glasgow, and known as Glasgow station. The next was at Wallace's cut, and was put in later than the other four, on account of the difficulty of seeing from Glasgow to Frenchtown. The last one was at the terminus at Frenchtown.

The evidence obtainable seems to indicate that there was a system of flag signals, by which the steamer at either end could communicate the number of passengers and amount of baggage to be transported, so that the train could be made ready. Just what this system was it does not seem possible to ascertain.

When the passengers and baggage had been trans-

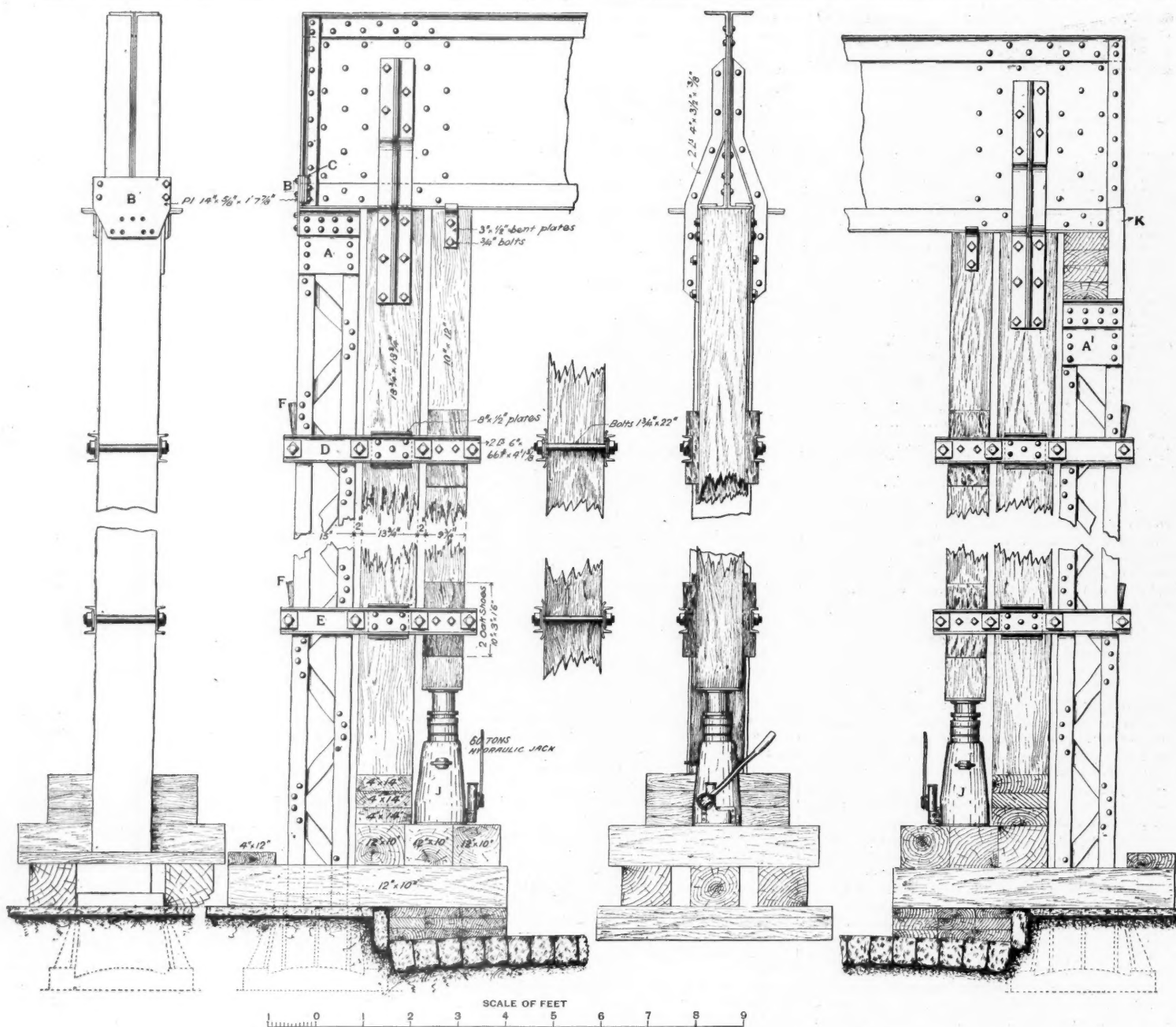


FIG. 2—METHOD OF LOWERING THE GRADE OF THE BROOKLYN ELEVATED RAILROAD.

Mr. O. F. NICHOLS, General Manager and Chief Engineer.

ferred and the train was just starting from New Castle, the man in charge of the signal at that point raised the ball to the top of the pole. The man at Bear having his telescope constantly directed to the New Castle signal, on seeing the white ball raised at that point, raised his ball to half the height of his pole. The men at Glasgow, Wallace's Cut and Frenchtown, each on the lookout with their telescopes, also raised their balls to half mast, thus conveying the information throughout the line that the train had left New Castle.

When the moving train had reached the man at Bear, he would immediately raise his ball to the top of his pole, as a signal both ways that the train had reached him, lowering his ball when the train reached the next man ahead. This operation was repeated successively at each of the four stations until the train reached the terminus at Frenchtown, and of course was reversed as the train traveled from Frenchtown toward New Castle.

When a train, having passed one station, did not arrive at the next, or it was seen to be in trouble in any way, the man at the station next nearer to New Castle would lower his white ball, and substituting therefor a black ball, kept at hand for the purpose, would raise it to the top of his pole, as a signal to be transmitted successively to New Castle, whence a relief train was dis-

patched to the assistance of the regular train. The balls were made of canvas stretched over hoop poles, bent to a spherical form, and painted white or black as the case might be.

The following persons are authority for the foregoing statements: George Hastings, of Kirkwood, Del., who ran an engine on the Newcastle & Frenchtown Railroad in the earliest days, and is still employed on the Delaware division of the Philadelphia, Wilmington & Baltimore; John Point, who was fireman on the first engine on the Newcastle & Frenchtown in 1833; and J. Henry Rogers, who was assistant to Chief Engineer John Randle during the construction of the New Castle & Frenchtown Railroad, in the capacity of Civil Engineer.

Lowering the Grade of the Brooklyn Elevated Railroad on Myrtle Avenue.

An elevated railroad, following as it does very nearly the contours of the ground, is likely to have some pretty steep, long grades, and the Brooklyn Elevated Railroad is not an exception. But there was one grade on Myrtle avenue, near Washington Park, which had occasioned more trouble than the others, not from its steepness alone, but from its steepness and length combined. In the original construction of the road this grade was

left high in order to have, at the top of the hill, a long level stretch of track for storage purposes. A third track was built in the middle of the street for that purpose. The company determined to do away with the storage track at this point, and the third track was removed, after which there was no reason for retaining such a steep grade. The grade in question, two per cent. for about 1,700 ft., had proved too much for the locomotives of the road. It had been a place fruitful of accidents and a source of considerable annoyance to the company, and when it was proposed to put a station at Cumberland street near the top of this grade, it became very necessary to lessen the grade at this point; to accomplish which it was determined to lower the track near the top of the hill and to substitute instead of the two per cent. grade, two grades of 1.24 per cent., together measuring 1,322 ft., and one at the proposed Cumberland street station 200 ft. long of .87 per cent. To do this it was determined to lower the elevated structure varying distances from a fraction of a foot to 5 ft. 7½ in. without interrupting traffic or blockading the street; and the following method was devised and carried out.

Wooden blocking was placed at each column upon the gutter side, and on this were placed two square

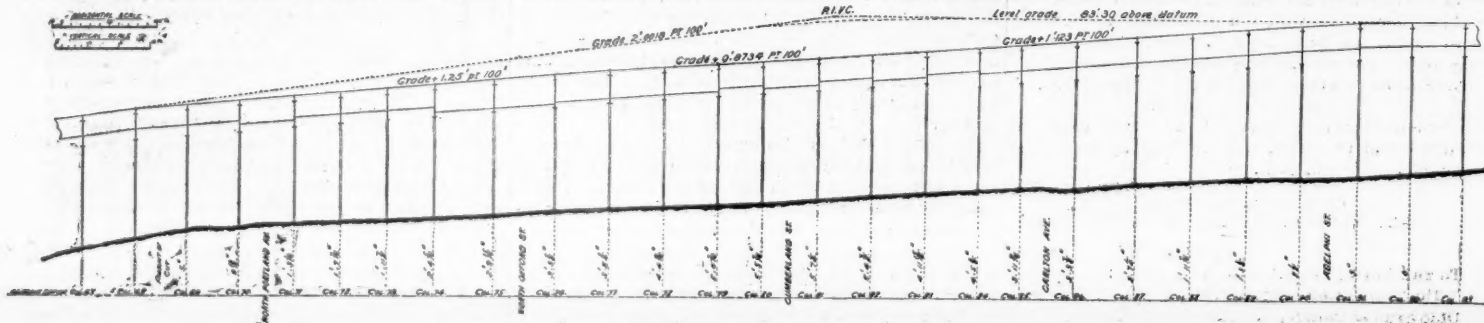


Fig. 3—Profile of the Brooklyn Elevated Railroad on Myrtle Avenue.

posts or timbers in an upright position, one 14 in. \times 14 in., resting upon the blocking and strapped to the column, and one 10 \times 12 in. strapped also to the column and larger post and resting upon a jack. See figs. 1 and 2. The larger and stronger post was placed upon several pieces of 4 \times 14 in. blocking and a 60-ton hydraulic jack with a 6-in. piston movement was placed under the smaller post. After the column was discon-

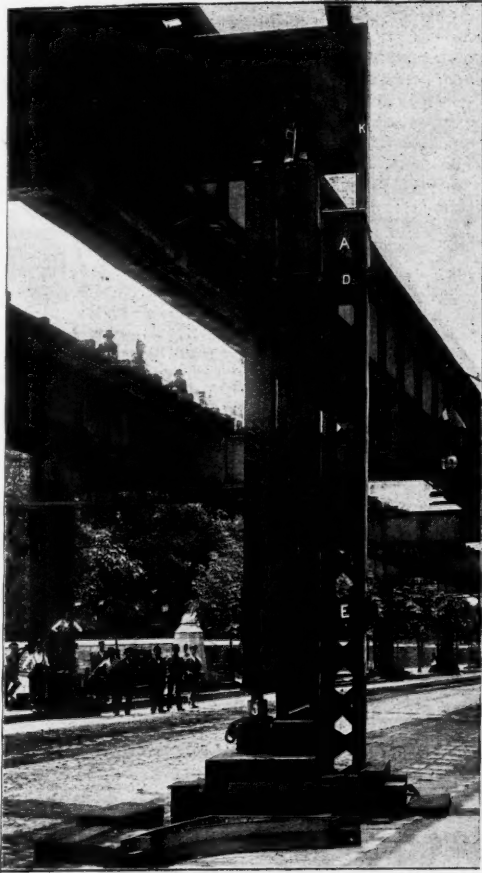


Fig. 1—Lowering Grade of Brooklyn Elevated Railroad.

nected from the girder, the load was taken off from the larger timber and column by operating the jack, and one of the 4 \times 14-in. plank pieces removed; then the jack was lowered the 4 in., with the girder and elevated structure. All these movements were made when the track was clear, and at no time was the structure supported upon the jack during the passage of trains. Every column had spliced to it throughout the whole length of the grade such an attachment of posts and jacks. See engravings, figs. 1 and 2. The diagrams show plainly the process employed, and the means by which the lowering of the track was accomplished.

Each separate girder was lowered but 4 in. at a time; that being considered the maximum that one end of a longitudinal girder could be dropped without damaging or straining the other end. Each transverse girder was therefore lowered consecutively 4 in. at a time, the whole 300 ft.

Only the inner channel of the post was cut off, the outer channel being left to cover over the end of the transverse girder (see figs. 1 and 2, K). The post and girder, after being lowered, were riveted together, thus strengthening the connection and insuring the outside channel carrying its proportionate load of the structure. The plates and lacing taken from the column were re-riveted lower down, making a new footing for the columns. Upon the end of the girder and the side of the column there was bolted a plate, B B, with shorter pieces riveted upon the inside, C, making a groove in which the end plate of the transverse girder could slide up and down and form an attachment between the girder and column while it was being lowered to prevent lateral motion and vibration of the track and girders. Stiffness was also secured by straps bolted to the column and two timbers and wedged as at F. The larger supporting post was also secured by strap bolts to the girder at the top. See figs. 1 and 2. It seemed advisable to take all these precautions against accident or possible danger in order to give the public confidence that the work was done with caution and great care, and that the structure was perfectly safe. There were no curves in the track and with the clamping of the columns to the post and the post to the girder no more vibration was perceived by the inspectors than when the girder was rigidly attached to the column.

The girders were cut from the posts by hand, and all cutting and trimming were by handwork with a hammer and chisel. The plates and lacing had to be removed from the upper end of the column, which was cut off; the plates at the end of the girder had to be chipped off so that they would enter the outside channel of the column; new holes had to be drilled in the column for the readjustment of the plates and lattices. It was designed to cut the columns and parts off

by a machine saw, but the contracted space in which the work had to be done so as not to interfere with traffic or street travel required this scheme to be given up, and all of the cutting, drilling and riveting was done by hand. This work was done upon swinging platforms suspended from the overhead structure, every column having one of these swinging platforms or scaffoldings. Notwithstanding this the whole job was completed in a few weeks and without any interruption of traffic or blocking of the street.

The profile, fig. 3, will show the old grade and the new, also the position of Cumberland street where the new station is located and the several grades adopted. The change still leaves 958 ft. of two per cent. grade. The length of track lowered was 1,322 ft., and it was lowered in 30 hours, not consecutive hours of work, but five days of about six hours each, the work having been done in the middle of the day when traffic was lightest. Both timbers at every column had to be sawed off when the lowering was greater than 16 in., and this was accomplished by blocking up with blocking on top of the columns. See figs. 1 and 2. In some instances it was done by supporting the unloaded structure upon the post over the jack, but when there was danger of trains passing it was customary to place blocking on the top of the column.

The track before lowering was estimated to be three-quarters of an inch longer than when lowered, and this difficulty was met by putting in a slightly shorter rail at frequent intervals to compensate for this contraction. The shortening of the track was not sufficient to require any alteration in the length of the girders, there being plenty of room or play at the ends to allow for this slight contraction. An illustration of the rapidity with which the work was effected is shown by giving the time taken to lower 26 bents 4 in. It was accomplished between 10 o'clock and 2 o'clock, and another of 4 in. was accomplished in the afternoon of the same day, making 8 in. each day. There was some fear that the springing of the columns over the end of the transverse girder, to allow it to enter the channel of the column, would crack the cast iron footings, but this fear seems to have been idle, as there is no evidence of injury to the casting.

Considering the amount of hand work one would expect the cost of this work to have been very great. Estimates by prominent engineers and by the Chief Engineer of the company were from \$7,000 to \$10,000. The actual net cost of the work was \$6,000, or from 14 to 40 per cent. less than the estimated cost. There were no accidents or injuries during the work, and travel upon the street and railroad were not impeded or interrupted to any extent.

The plan was designed and carried out under the direction and supervision of Mr. O. F. Nichols, Mem. Am. Soc. C. E., the General Manager and Chief Engineer of the road, the work being done under the direct superintendence of J. H. Simmons, Road Master.

Improved Poling Attachment for Yard Engines.

Readers of the *Railroad Gazette* are doubtless familiar, by this time, with the fact that the most economi-

cal method of breaking up a long freight train is to push the cars away from the train by means of a timber or pole, the power being derived from a locomotive on an adjoining parallel track. This process has been in use on the Pennsylvania road for a number of years and

was described, with illustrations, in the *Railroad Gazette* of Dec. 10 and 24, 1886. But improvements are made in everything, and this apparatus is not an exception; and we publish herewith an engraving showing an apparatus lately put in use on the Pennsylvania at Wall, Pa., near Pittsburgh, the location of a large yard.

In "poling" cars there is more or less danger to the "poler," the man handling the pole. The pole is liable to break, come out of the socket or knock him off of the engine. To remedy this evil, Mr. D. O. Shaver, Master Mechanic at Pittsburgh, devised the scheme shown in the accompanying photograph.

There is with this arrangement not the least danger to the poler, as he is entirely out of the way of any harm. In the old way the pole, which consisted of a stick of Oregon pine, was held up by a chain or rope fastened to a stanchion on the bumper. The poler stood on the footboard and worked the pole with his hands. In the present arrangement a platform was placed on top of the bumper, and around it was run a handrailing. The front end of the engine was partitioned off to make the man's position cooler.

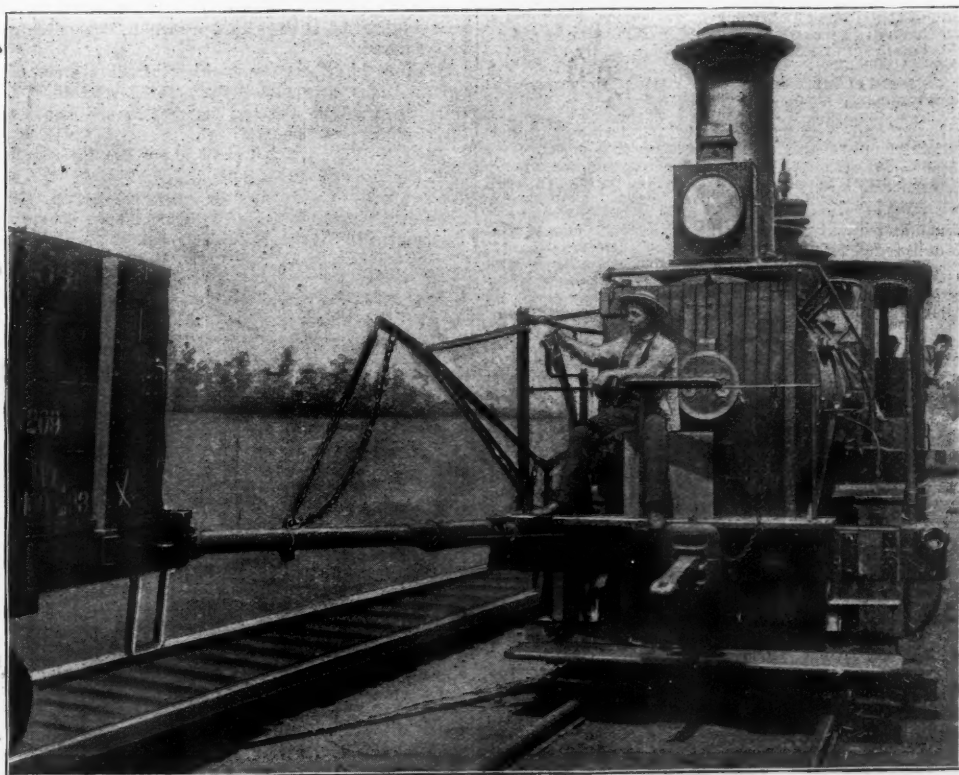
The pole consists of two parts. The front piece is a solid bar of iron, at the end of which is a dove-tail cap to engage the end sill of the car; the other end fits into a socket, inside of which there is a stiff spring to lessen the jar when the pole strikes against the car. The socket of the pole rests against the bumper of the engine and is held in place by a bolt around which there is a spring which presses against the bottom of the socket.

To swing the pole against the side of a car, the crank is turned, pushing the end of the pole over against the car. The crank is attached to a bell crank fastened to a rod from the side of the pole. To raise and lower the pole so as to adjust it to the varying heights of cars, the "reverse lever" is moved forward or backward. This is connected by a bell crank to the end of the fulcrum or lever. There is an extra chain or safety chain fastened from the end of the pole to the fulcrum, to support the pole in case of breakage. The two ends of the pole are held together by two small links.

The Car Service Associations—Their Objects and Work.*

The principle of demurrage as embodied in the regulations of the Car Service associations has now been pretty generally in force for about three years. The record shows that four associations were organized towards the close of the year 1888, the principal one of which was the Chicago Car Service Association, and from the operation of which the feasibility of the scheme was demonstrated. The action of the General Time Convention at its spring and fall meetings of 1889, recommending the formation of Car Service associations, gave impetus to the movement, and during the closing months of 1889 and the year 1890, 24 associations were organized and eight have been added since that time, so that we now have 36 Car Service associations in operation throughout the country, and bringing from twelve to fifteen million cars per annum under the operation of Car Service rules.

Friction in attempting to enforce regulations upsetting old and settled methods was inevitable. The conditions were new and untried and many railroad officials were not entirely sure of our ground. The legal departments advised caution. The agents



Improved Poling Apparatus Used at Wall, Pa.—Pennsylvania Railroad.

who were expected to enforce the rules were themselves in many instances lukewarm or openly antagonistic, and sometimes the traffic department has

*A paper by A. L. Gardner, Manager of the Baltimore and Washington Car Service Association, read at the recent Annual Convention of Managers at Chicago.

given us more trouble than the public; so that when we look back to the obstacles that have been encountered, I think we may fairly congratulate ourselves that so much has been accomplished. The demurrage principle has been upheld by decisions of the Courts in nine states, and by the Railroad Commission of two others, and is now accepted by the shipping public and acknowledged as a beneficial factor in commercial transactions.

I think it is unfortunate that there has not been some standard plan prescribed for operating the Car Service associations. The various methods of computing detention and accounting diverge. In the last quarterly report of the National Association 23 associations show the total average detention, divided between consignee and railroad, one shows consignee's detention only and ten give total detention without division, but which is presumably nearly all consignee's detention. Consequently, comparison from any given standard is impossible. In the matter of forms, blanks and general plan of operation each manager has been a law unto himself. . . . Notwithstanding this diversity of method, a great deal of progress has been made. Shippers and receivers began to see that their business was not being destroyed, and the dire results predicted were not being realized, but on the contrary, commercial transactions were being materially facilitated, and many who were most bitter in opposition to the rules openly acknowledged their beneficial effects; and the agents began to see that they were not only *not* losing traffic, but the fact also dawned upon them—hitherto never dreamed of in their philosophy—that their competitor was actually keeping the agreement and enforcing the rules. The caller who comes into your sanctum with blood in his eye is not nearly so numerous or outspoken as he was the first year or two. Owing to the quasi-public nature of his office, the manager must adjust his work to a great deal of interruption, and he may feel sometimes that an entire day has been wasted, and yet he may have saved his company a lawsuit. But it is not alone in the general results that progress has been marked; the whole matter of forms, blanks and method of accounting has been revised and the office work reduced to the lowest point possible without sacrificing efficiency. We have discarded the old car record book, which was a monstrosity of 700 pages, 19 by 23 in., and weighing over 50 lbs., and adopted a smaller and less expensive book much better adapted as a record and for handling. We have discarded the old agent's daily car report, forms 1, 2, 3, and 4, which were largely a repetition of work, and substituted therefor one report giving the same information in similar columns, thus relieving the agent of a large amount of work in connection with these reports.

The last quarterly report of the Secretary of the National Association gives the average consignee's detention as 1.26 days per car. Considering the fact that on quite a number of commodities 72 and 96 hours are allowed, the result must be considered very gratifying, and I believe that the commercial side has yielded up about all that can be expected, and any further reduction must be looked for in the direction of better service. I presume there is scarcely a railroad in the country that has ample delivery tracks or storage facilities to place its traffic for unloading immediately upon arrival. The tendency for the past ten or fifteen years has been to increase the number and size of cars in freight service, and the number of cars in train, while the delivery yards in large cities have not been increased in proportion, and in many instances not at all; nor do I think the facilities of receivers have been proportionately increased. Consequently much of the car increase has gone for storage. . . . It has been said that notwithstanding the Car Service Association movement has reduced the detention about four days per car on 12,000,000 cars per year, the mileage of cars has not been materially increased. There are of course numerous causes that may contribute to this, but I think the principal one is the small percentage of the car movement that is subject to Car Service rules. I have no means of knowing what this proportion is generally, but from approximate figures obtained I find that not over 27 per cent. of the cars handled in Baltimore come under Car Service rules, and if this is any indication of the situation at other large seaboard terminals, it can hardly be expected that the detention saved on this small number of cars should materially affect the whole.

Of the 34 Car Service associations shown on the last quarterly statement of the Secretary of the National Association of Car Service Managers, 23 report railroad and consignee's detention. Among the 11 which do not report in this way are five or six of our largest associations. I have mentioned some of the reasons why I consider it important to include railroad detention, and some of the good results arising therefrom. Now let us consider some of the objections to this plan raised by some of the managers. One is, that cars in outer storage yards at large terminals are not under the agent's jurisdiction until brought in and placed on delivery tracks. This is a matter easily remedied. Card manifests are usually sent to the agent on arrival, or if not he can easily arrange to have the yard master furnish him a daily report of arrivals for his car service record. My experience is that cars at outer yards are sufficiently under the supervision of the agent so that he can order them not brought in if delivery tracks are full, or if for any other purpose he so desires; and if report of outside arrival is not required, you have no means of knowing but what he is holding back cars for a favorite consignee. Another objection raised is, that it would not do to report railroad detention, because the manager of one road in the Association would object to having the managers of the other roads know how long his road is delaying its cars. It seems to me the worst part of this is, he don't know himself; for the fact is you are only giving him partial figures, and from the rosy showing they make he concludes that all is well and sees no necessity for improvement; whereas a true presentation of the case might show many cars standing in yards from 15 to 30 days before being placed. Still another objection that has been raised is the expense. I am satisfied the accounting in this way involves no additional expense. It is of course a little more work, but it can be so systematized as to require no additional force.

The necessity of uniform reports, based upon a standard method of computing detention from actual arrival, and showing the average railroad consignee's and total detention is important. Many of the large railway systems are members of from two to ten different car service associations. These reports are so diversified in character as to be impossible of comparison. Some of them count detention from actual arrival, others from placing, and still others from an arbitrary period. I have been asked to explain why detention in the Association I represent was so much greater than that of others shown by the National Secretary. Of course this may be largely governed by local conditions, but to what extent cannot

be determined, owing to different methods of computing detention. With a standard method of reporting among the associations the situation at various large commercial centres could be seen by comparison, and possibly avenues of improvement suggested. Why cannot we have standard work?

The Ramsey-Weir Electrical Interlocking Apparatus.

The idea of moving switches and signals directly by an electric current is not new in this country, having been tried in Pennsylvania by the Wharton Switch Co. early in the eighties, but to Mr. F. C. Weir, M. Am. Soc. C. E., belongs the credit of having overcome the difficulties heretofore encountered. Electrically operated switches of the Ramsey-Weir type have been in successful operation on the Cincinnati, Hamilton & Dayton at College Hill, O., for a period of three years; and in the yards of the Cleveland, Cincinnati, Chicago & St. Louis at the Grand Central Depot in Cincinnati a complete Ramsey-Weir electrical interlocking system has been in use nearly two years. Of these two plants the one of latest construction, the one in the Big Four yard, operating 10 signals and 10 switches, is here described.

Before entering into a detailed description it will be necessary to describe the power plant. This consists of a small gasoline engine, operating an Edison dynamo with a power of 125 volts, and a storage battery. To charge the storage battery for 24 hours requires the operation of the engine and dynamo for six or eight hours; and the engine consumes for this work from eight to ten gallons of gasoline at a cost of 7½ cents a gallon.

The men in the tower, three of them, working eight-hour shifts, attend both to the dynamo and to the operation of the switches and signals.

This apparatus is made by the Weir Frog Co., of Cincinnati, and it is claimed to be not only of low first cost, but cheap in cost of maintenance. It is novel, in that it is the first and only complete system in this country in which not only the locking power, but the moving power, of the switches and signals is electricity. The first plant, from the original designs, has been in operation for over three years, receiving no attention except from the operator in charge. Out of the first 15,000 movements recorded there was but one failure to be charged to the system, and that was on the side of safety. The number of movements recorded to date is now about double that, and the second set of records stands clear—no failures.

The interlocking is accomplished by means of electrical contacts, controlled by electromagnets in the operating case, the contacts, in their turn, being governed by the positions of the signals and switches. Dynamic electricity is used at a pressure of 120 volts. All wires are buried underground, though at country stations they may be carried on poles. The switch operating and track boxes are fixed between the ties, and also carry guards, thus leaving the ground free, and reducing the danger of interruption from derailments. A noticeable difference from mechanical systems is that such a system moves in all its parts, its entire length, from the tower to the most distant signal, and the pipes and wires and their carriers require care and attention; while with electric power the moving parts are concentrated at the signal or switch, the wires having no motion.

To aid in describing the working of this system, each part will, for convenience, be treated separately, and then the relation existing between them—that is, the interlocking—will be described.

Signals.—Figs. 1, 2, 3, 4 and 5 show the interior and working parts of the signal box, as well as its exterior appearance. The working parts are wholly contained in and thoroughly protected by a steel box. The chief instrument in the box is an electric motor, whose elon-

cuit and the magnet itself, by means of the lug on the arm *p*, holds the blade in that position, and it can thus be held only by the presence of a current in the signal circuit. The fulcrum of arm *p*, at its upper end, is fixed to the side of the case.

Each signal controls a contact, within the box, which is closed only when the signal is at danger. These contacts are connected to home and distant signals in series and operate a signal indicator and controlling circuit. The home signal also controls the contact which is in the circuit leading to the distant signal. This is closed only when the home signal is brought to clear, so that a clear distant signal can be given only after the home signal is brought to "clear."

Switch-Thrower.—Figs. 6, 7 and 8 show the device for throwing the switch. This box is placed between the ties on the side of the track, and ordinarily stands no higher than the top of the rail. Here, as in the signal, centrifugal force is the power used. A two-toothed ratchet wheel and pawl impart, each time the revolving arms spread, half of a revolution to the crank carrying the connecting rod to the switch-rail. A spiral spring brings the balls to their normal position as soon as the current in the motor ceases. Fig. 8 shows the locking and unlocking device. The locking arm carries upon its extreme end an electrical contact closer, which closes the circuit only when the switch is locked in position. This circuit, which is styled "switch indicator circuit," will be referred to later on.

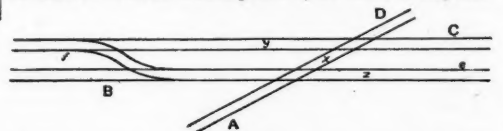
A brake, which is made inoperative by the presence of a current in the switch motor circuit, absorbs the momentum of the revolving arms after the current ceases, and thereby makes it possible to throw the switch a second time without delay. The motors in the switch throwers are of ¼ H. P., and those in the signal boxes ¼ H. P.

Track Boxes.—Each switch or derailing point whose position is related to that of a signal has attached to it a track box, shown in figs. 9 and 10. This box carries two pairs of contact points, one of which is closed according as the switch is thrown fully to one side or the other. These, being in the switch indicator circuit, control, together with the locking contact just spoken of, the switch indicator in the tower, and therefore, besides furnishing the means of interlocking, indicate whether or not the switch is fully opened, or closed, and locked. It should be remarked that this forms a very simple and effective means of locking signals to protect hand thrown switches and also of locking any points which may be between a distant and a home signal.

Operating Case.—Figs. 11 and 12 show the operating case, fig. 12 with the front removed. Of the two rows of levers for closing circuits, the front is for signals and the rear for switches. Above each is the indicator which indicates the position of its respective signal or switch.

The magnets which operate these indicators also control numerous mercury contacts, which contacts are included in the switch and signal circuits in such a way that it is necessary that the proper combination of closed contacts exists, in order to throw either a signal or a switch. The magnets of the upper row, of which there is a duplicate set in the rear (not seen in the photograph), are in the switch indicator circuits, and are controlled by the position of the switch points through the track boxes and the locking contacts in the switch throwers. The lower row, the signal indicators, are energized only when the signals are at danger. Their contacts, which are included in the switch circuits, make it impossible to throw a switch unless the proper signals are at danger.

For example, in the accompanying diagram, if the operator attempts to clear the signal at *A* to permit a train on track *x* to cross tracks *y* and *z*, he finds it impossi-



ble to do so unless the signals at *B*, *C*, *D*, *e* and *f* are all at danger, as the circuit from lever *A* to signal *A* runs through mercury contacts which are closed only when these signals which conflict with *A*'s route are in the danger position.

General Remarks.—The position of the switches is indicated to the operator by the switch indicators, which stand out plainly before him. By running his eye over these lines of telltales he can tell the position of each switch, including those that are thrown by hand as well as those thrown from the tower. Any alterations and changes in the tracks can readily be provided for and additions can easily be made. Switches and signals at a distance can be operated as easily as those near at hand.

Automatic blocking can easily be operated by using these signals in conjunction with interlocking plants. The signals themselves are well adapted for block signaling, with power stations not closer together than 25 or 30 miles.

Should it be found desirable to make any change in the order of throwing switches, it can be accomplished by simply changing the wiring in the operating case, an operation which would be much more costly with either the electro-pneumatic or mechanical systems of interlocking. At one of the Cincinnati plants it is proposed to connect the signal tower with a wire from one of the

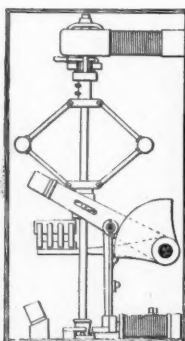


Fig. 3.

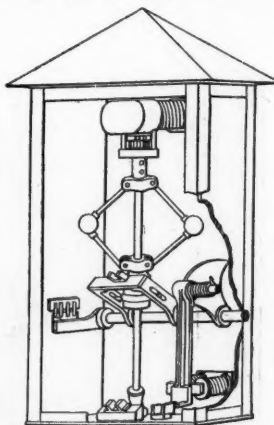


Fig. 4.

gated shaft carries a pair of centrifugal arms and balls, such as are commonly used for governing steam engines. It is the centrifugal force generated by these balls, revolving at 2,500 revolutions a minute, which furnishes the power for pulling the signal arm to "clear," the normal position being danger, where the arm is held by a counterweight.

Upon the blade being drawn to clear, an electromagnet *m*, fig. 3, automatically cuts the motor out of cir-

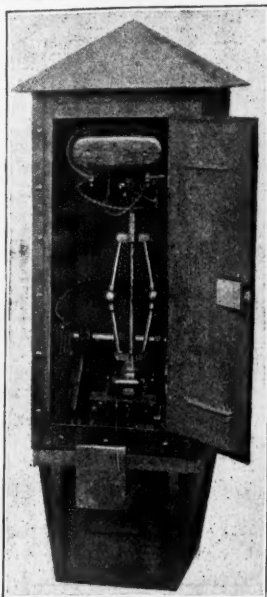


Fig. 1—Signal Motor.



Fig. 9—Switchbox.

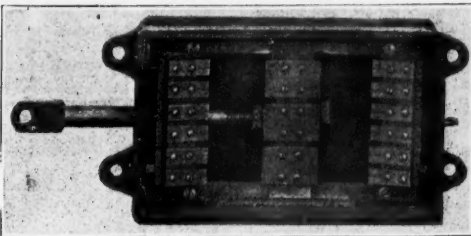


Fig. 10—Switchbox with Cover Removed.

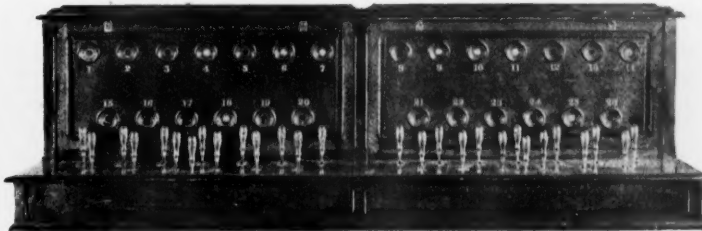


Fig. 11—Operating Case.

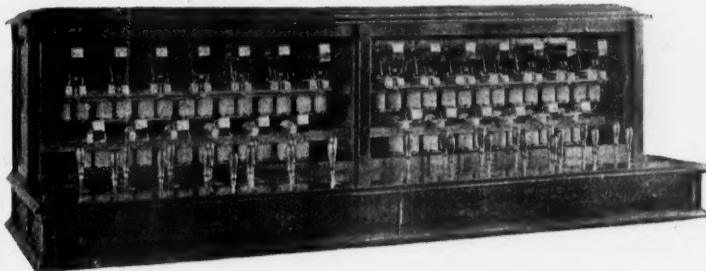


Fig. 12—Operating Case.

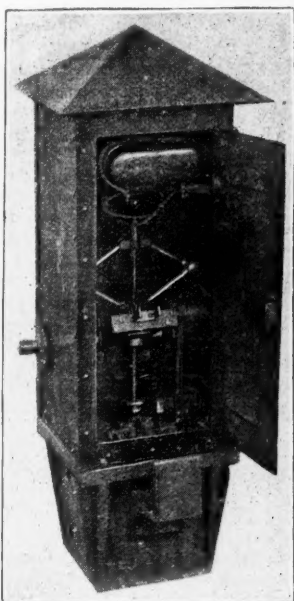


Fig. 2—Signal Motor.

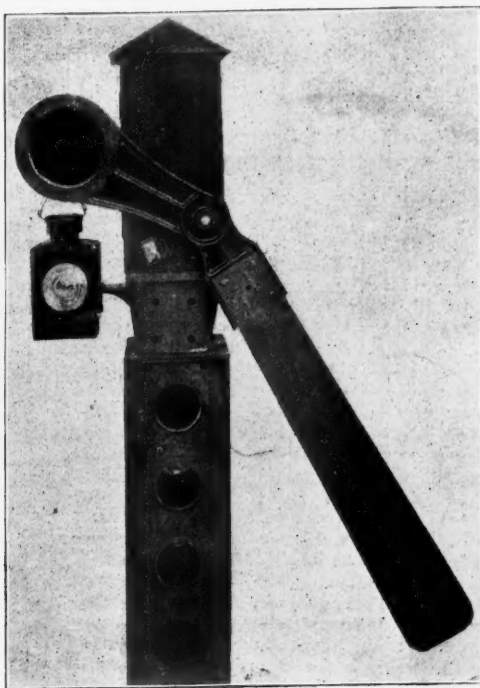


Fig. 5—Electrically Operated Semaphore.

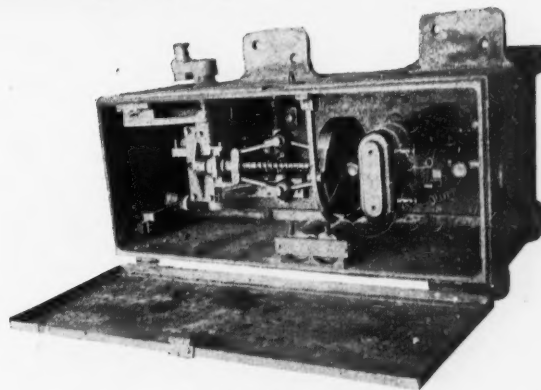


Fig. 6—Switch Motor.

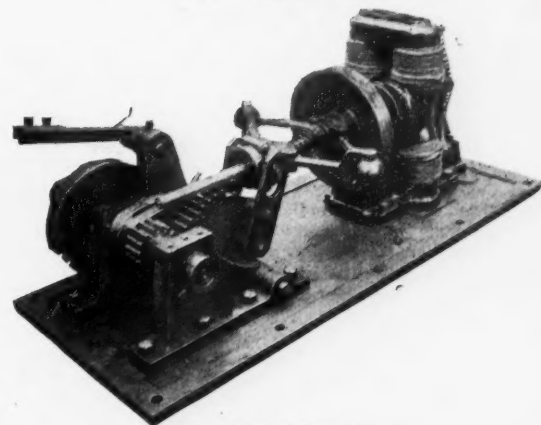


Fig. 7—Switch Motor.

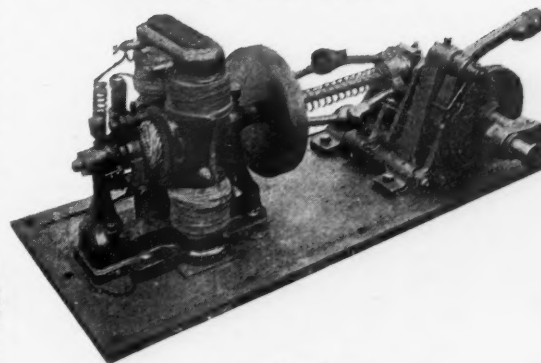


Fig. 8—Switch Motor.

THE RAMSEY-WEIR ELECTRICAL INTERLOCKING APPARATUS FOR SWITCHES AND SIGNALS.

city electric power lines, and to use the tower dynamo only in case of emergency. From experience gained in putting in these signals Mr. Weir believes that his system can be put in at a cost of from 25 to 50 per cent. less than either mechanical or electro-pneumatic interlocking. The generation of the electric current can be accomplished, he thinks, at a slightly less cost than the compression of the air in the electro-pneumatic system.

There have been no failures to interlock. The sequence of movements, by virtue of which a clear signal cannot be given until the route has been prepared for it by setting switches in their proper position, is absolutely secured by the order in which the electric circuits are closed.

A Standard Method of Conducting Locomotive Tests.

The report of the committee of the American Society of Mechanical Engineers, appointed to recommend a standard method for conducting locomotive tests, was presented to the Society at the International Engineering Congress. The report begins by calling attention to the fact that about one-third of the total production of bituminous and anthracite coal in this country is consumed in locomotives, to show why it is necessary that the design, construction and operation of locomotives should be as nearly perfect as possible. To keep pace with the rapidly growing interests in the improvement of the locomotive, efficiency tests must be made, and it was the duty of the committee to recommend such methods that, when followed closely by different operators, at different places, the results obtained by each would be comparable.

The committee recommended both "shop" and "road" tests; the shop test for determining questions bearing upon the economy of the boiler and engine of a locomotive, the relative economy of compound and simple locomotives, or the effect upon the economy produced by different classes of fuel in various methods of operation; the road test for solving other problems con-

nected with locomotive service, and, in general, to ascertain the performance of the locomotives in regular work. In the road test, to ascertain the efficiency of a locomotive when working normal, as nearly as possible, the test should be made on through special trains over a route at least 100 miles long. That the data may be compared with similar data from another locomotive, the two should be tested over the same route and hauling the same identical train. In making tests not as elaborate as efficiency tests, the arrangements should conform as nearly as possible to those recommended by the committee. The dynamometer car should be used in road tests to obtain a continuous record of the useful work done throughout the whole test, an exact average of which can be obtained.

Either shop or road tests should be conducted with such completeness that all the information relating to the performance of both boiler and cylinders be determined. The data found should embrace weight of coal burned, its chemical analysis, its heat of combustion, weight of ashes and cinders, weight of water evaporated and that lost in various ways, the moisture in the steam, temperature of escaping gases, analysis of gases, force of draft, pressure of steam in the boiler and steam chest, number of revolutions of the drivers per minute, indicated horse power of the engine, tightness of valves and pistons, and pull on drawbar. In measuring the coal used in road tests, the depth of the fire should be observed just before starting, and at the end of the run, and suitable correction made for differences in the two observations. The use of a reliable water meter, suitably calibrated, was advocated for measuring the feed water, readings of the meters to be checked at water stations by tank measurements, and correction to be made for any difference in height of water in the boiler at beginning and end of test. The heat value of coal should be determined by the oxygen calorimeter, which is easily manipulated; the wire drawing calorimeter to be used

with or without the separating apparatus, as found necessary to determine the quality of steam supplied by the boiler. It was recommended that this be attached to the steam dome. Much stress is placed on the importance of having the valves and pistons free from leaks.

As a standard basis on which to compare the efficiency of locomotives, was recommended the number of pounds of standard coal burned per dynamometer horse power per hour; the term "standard coal" to refer to coal in which the total heat of combustion, as determined by an oxygen calorimeter, is 12,500 B. T. U's per pound. This unit represents the total heat of the average grades of coal used in the United States. The consumption of standard coal is referred to the dynamometer horse power because it is a correct average record of the power developed and be-

cause it is the useful work done by the engine. It was not the desire to confine comparison to the standard coal and dynamometer horse power as it is recommended, also the weight of coal and water, the number of heat units of the steam consumed per indicated horse power per hour, the same, referred to dynamometer horse power, the weight of actual coal and standard coal referred to the ton-mile of total load and the ton-mile of train load, and the number of pounds of water evaporated per pound of coal. There were shown with the report two cuts illustrating the views of the committees on pantograph motion, and several cuts showing the mechanism of dynamometer cars used on the C., B. & Q., the Pennsylvania, and the C. M. & St. P. Suggestions were also given about the number of assistants required in making a complete test and their different positions and duties, concerning the use of speaking tubes, electrical connections between pilot of engine and dynamometer car and the use of a revolution counter to give the number of revolutions per minute direct.

Starting Valves of the Baldwin Locomotive Works.

The starting and cylinder cock valve used on the Vaucain compound locomotives is doubtless somewhat familiar to most of the readers of the "Railroad Gazette," although it is, perhaps, doubtful if its action is clearly understood by all. We give below extracts from a description of this valve prepared by the officers of the Chicago & South Side Rapid Transit Railroad Company for the use of the engineers and firemen on that road; also illustrations and description of a new valve just brought out by the Baldwin Locomotive Works, somewhat simpler in form, and intended to replace the valve previously used.

Fig. 1 shows the course of the steam in the main valve and cylinders of the Baldwin compound. In this illustration the main valve is shown, for the purpose of clearness, directly between the high and low-pressure cylinders, although in actual practice the two cylinders are placed as close together as possible with the valve at one side and inside the frame of the locomotive. This shows the course of the steam in the cylinders when the engine is working compound, and with the exception of the small jet of high-pressure steam admitted through the starting or by-pass valve, the same course is followed by the steam when the engine is working high pressure.

Suppose that in this illustration, a small pipe with a valve in it connected the passages BB. If this valve were open, as when the lever in the cab is in its middle or front position, steam will pass freely through the valve and pipe from one passage B to the other and balance the high-pressure piston. This is the function of the by-pass valve, and the action is as follows:

Steam passes from the boiler in the steam valve chamber and continues on in the steam passages of the high-pressure cylinder. The larger part of this steam continues on to the low-pressure cylinder through the main valve just as when the engine works compound; but the remainder of the steam passes through the pipe and starting valve to the back steam passage B on the right of fig. 1, mingling with the steam that is exhausted from the back end of the high-pressure cylinder and passing to the front end of the low-pressure cylinder, thus increasing the pressure of steam therein. This increase goes on until the engine starts, and, in case the engine does not start readily, the pressure in the low-pressure cylinder will become equal to boiler pressure. After the engine starts the pistons move so rapidly that the small opening in the by-pass valve cannot supply steam fast enough to keep up the pressure. At high speeds the proportion of steam reaching the low-pressure cylinder through the starting valve is very small.

It will be seen from the foregoing that with the high back pressure in the high-pressure cylinder, the greater part of the work will be done in the low-pressure cylinder. The piston in the low-pressure cylinder being of greater area than that of the high-pressure, the combined effort of the two pistons is much greater when the engine is working high pressure than when working compound. The operation of the starting or by-pass valve will be understood by referring to fig. 2. On the right is a small diagram showing the positions of the lever in the cab, as follows: (1) Starting valve open, cylinder cocks open; (2) starting valve open, cylinder cocks shut; (3) starting valve closed, cylinder cocks closed. The full line corresponding to the position of the lever in the valve bears the same relations to the ports, as shown in the illustration. It will be seen that in this position of the valve steam can pass freely from one end of the high-pressure cylinder through the ports inside of the starting valve, and so on to the steam passage leading to the other end of the low-pressure cylinder. This is the position of the valve when working with the starting valve open and the cylinder cocks closed.

Fig. 3 shows the position of the starting valve when the engine is working compound. In this position is steam passes through the valve, the ports both for cylinder cock and starting valve being closed.

In fig. 4 is shown the position of the valve and lever in the cab when the cylinder cocks and starting valve are open. In this position there is free communication

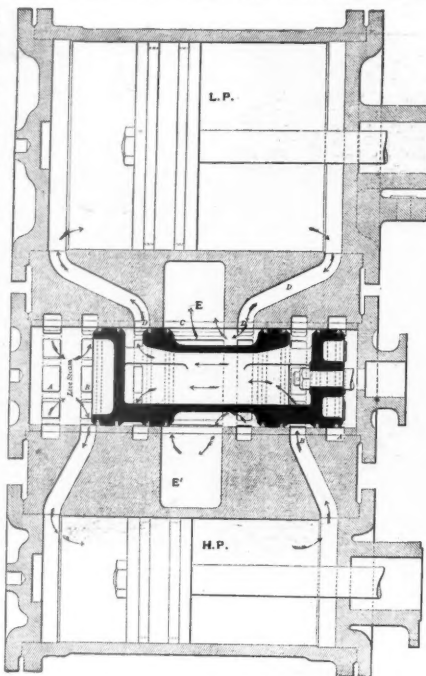


Fig. 1—Cylinders and Main Valve.

L. P., low pressure cylinder; H. P., high pressure cylinder; E and E', exhaust to stack.

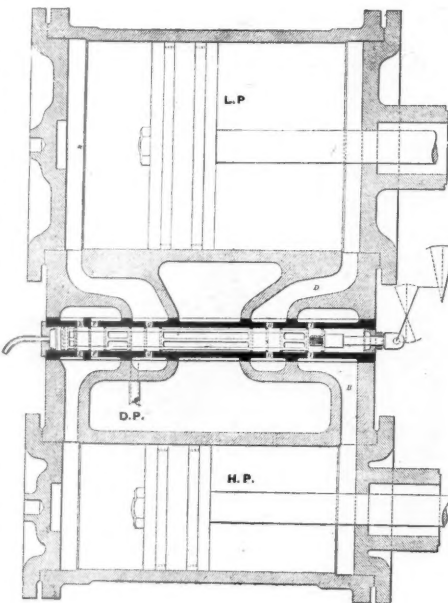


Fig. 3—Cylinder Cocks Closed, Starting Valve Closed and Engine Working Compound

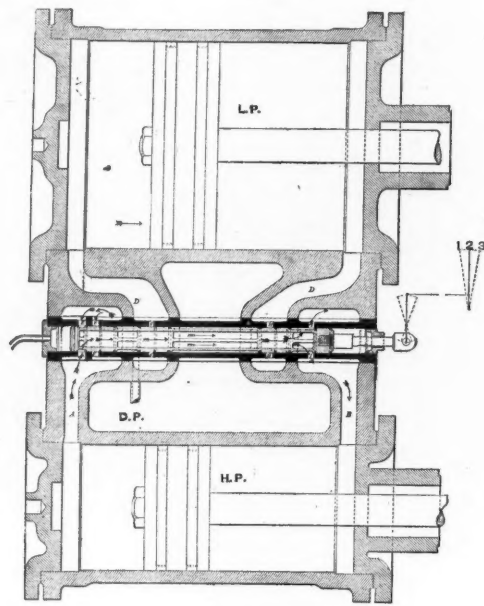


Fig. 2—Cylinders and Starting Valve; Starting Valve Open and Cylinder Cocks Closed.

D. P., drain pipe.

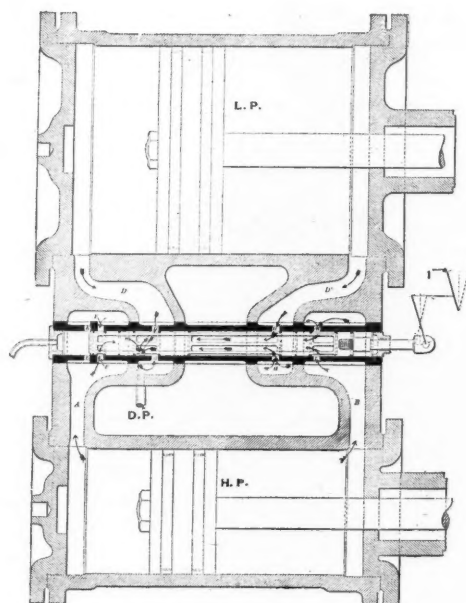


Fig. 4—Starting Valve Open; Cylinder Cocks Open.

CYLINDERS AND VALVES FOR VAUCLAIN COMPOUND LOCOMOTIVE.

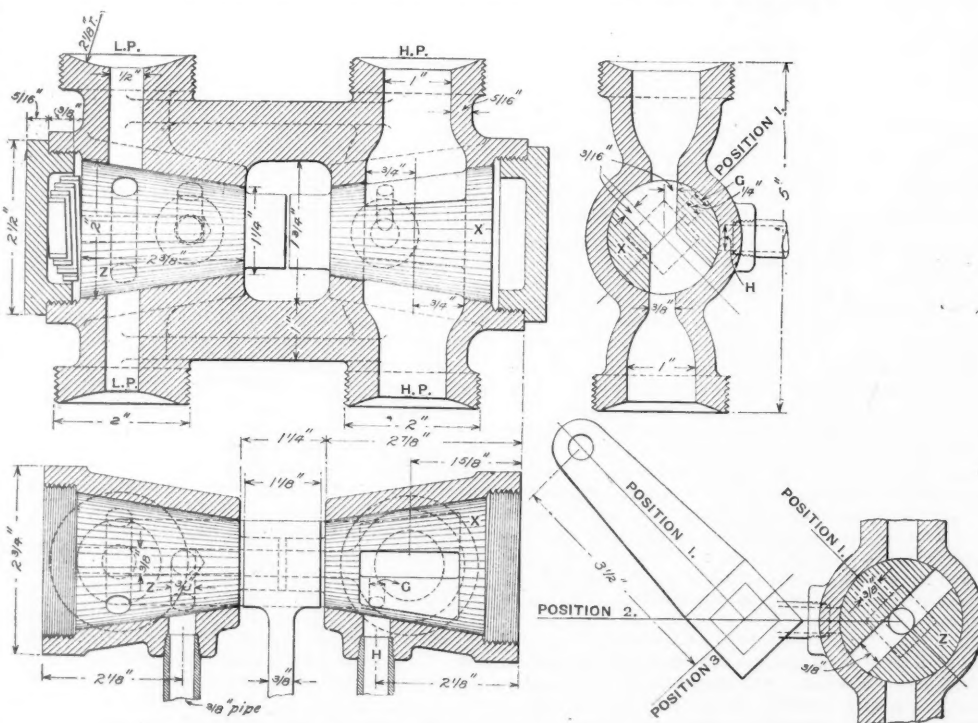


Fig. 5—Combined Cylinder Cock and Starting Valve for Vaucain Compound Locomotive.

between both ends of both cylinders and the cylinder cock drain pipe through the centre of the valve. This allows the cylinders to be drained, as shown by arrows.

It will be understood that in figs. 2, 3 and 4, the cylinder cock and starting valve has been placed between the two cylinders, as in the case of the main valve, in fig. 1, for the purpose of more clearly showing its action as related to the high and low-pressure cylinders. The actual position is considerably lower, as shown in fig. 6, illustrating the attachment of the new cylinder cock and starting valve. This permits of satisfactory drainage from the cylinders. It will be readily seen that the construction of the new valve is somewhat simpler than that of the older valve, and less liable to allow leakage. The body of the cock is in one casting, into which are put the two taper plugs, one of which, X, fig. 5, controls the steam for starting, and the other, Z, fig. 5, controlling the low-pressure cylinder cock. The passage leading to the cock X is connected to opposite ends of the high-pressure cylinder, and those from plug Z lead to opposite ends of the

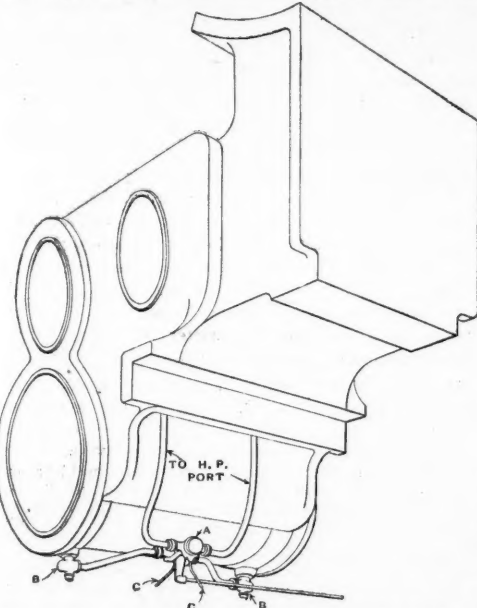


Fig. 6—Combined Starting Valve and Cylinder Cock for Compound Locomotive.

low-pressure cylinder. The two cocks have a screwed end upon which is one arm which operates the two cocks simultaneously.

In fig. 5 the opening in the plug X allows the steam to pass through, putting in communication the opposite ends of high-pressure cylinder, thence through valve to effective side of low-pressure piston; all the openings in cock Z being closed when the arm is moved to position No. 2. The opening in plug X allows the steam to pass through as before, but it also brings hole G opposite hole H, allowing any water to escape from high-pressure cylinder to atmosphere. Plug Z, with arm in position No. 2, allows the three openings in the plug to come opposite the three openings in the body, thus draining the low-pressure cylinder. The arm in position No. 3 closes all openings and is the running position. The cock is operated from the cab by a lever with a notched quadrant, corresponding to the three positions of the arm. The cock is applied to the cylinder, as shown in fig. 6.

Rack Railroads.

Mr. Albert Schneider, Privy Councilor of Public Construction to the Duke of Brunswick, prepared for the International Engineering Congress a paper on the "Construction and Operation of Rack Railroads," which was translated by Mr. Hildenbrand, representative of the Abt system for America. We shall give a few of the statements and conclusions and statistics of existing rack railroads, not attempting to make a very full abstract of the paper.

Mr. Schneider credits Blenkinsop with the first rack railroad, built in 1811, near Leeds, England. The rack was connected with one of the outer rails and did not give satisfaction and was soon abandoned. The first successful rack railroad was that built by Sylvester Marsh, up Mount Washington, N. H., opened in 1869, 3.29 miles long, with a maximum grade of 37 per cent. This was at once followed by the Rigi road, built by Riggenbach. The following table, A, gives a list of the rack railroads built on the Marsh or Riggenbach system.

In all of these the rack is of the ladder type, that is, angle or channel irons with round or trapezoidal bars across to form the teeth for engagement with the cog wheels of the locomotives. Mr. Roman Abt followed in a few years with his well-known system, which included a new kind of rack rail and a locomotive for combined service—rack and adhesion. The first road to be built on this system was that from Blankenburg to Tanne, in the Harz Mountains, and a table, B, gives the existing roads of this type.

Abt's rack has been often described, the last application of it specifically described in the *Railroad Gazette*

TABLE A.—RACK RAILROADS—MARSH OR RIGGENBACH SYSTEM.

No.	Name and location.	Length, Miles.	Max. grade per cent.	Gauge, Ft. In.	Mode of operation.
1	Mt. Washington, N. H.	3.29	37	4 8 1/2	Rack.
2	Vitznau, Rigi, Switzerland.	4.35	25	4 8 1/2	"
3	Ostermündingen, Switzerland.	0.93	10	4 8 1/2	Rack, adhesion.
4	Kahlenberg, Austria.	3.11	11	4 8 1/2	Rack.
5	Rorschach, Heiden, Switzerland.	3.42	9	4 8 1/2	"
6	Arth, Rigi, Switzerland.	5.59	21.8	4 8 1/2	"
7	Wasseraffen, Germany.	1.24	7	3 3/4	Rack, adhesion.
8	Rüti, Switzerland.	0.31	10	4 8 1/2	"
9	Laufen, Switzerland.	0.19	5	4 8 1/2	"
10	Friedrichshagen, Germany.	1.55	10	3 3/4	"
11	Green Mt., Mt. Desert, Me.	3.73	25	4 8 1/2	Rack.
12	Petropolis, Brazil.	4.35	15	3 3/4	"
13	Corcovado, Brazil.	2.17	30	3 3/4	"
14	Drachenfels, Germany.	1.24	20	3 3/4	"
15	Rüdesheim, Germany.	1.49	20	3 3/4	"
16	Degerloch, Germany.	1.24	17.2	3 3/4	"
17	Zakartoz, Hungary.	3.42	8	3 3/4	Rack, adhesion.
18	Assmannshausen, Germany.	0.93	20	3 3/4	Rack.
19	Naples, Italy.	0.50	7	3 3/4	"
20	Gaisberg, Austria.	3.42	25	3 3/4	"
21	Langers, France.	0.93	17	3 3/4	Rack, adhesion.
22	Sumatra, Asia.	18.64	12	3 3/4	"
23	Brünnig, Switzerland.	9.94	12	3 3/4	"
24	Höllenthal, Black Forest, Germany.	21.75	5.3	4 8 1/2	"
25	Petersberg, Germany.	0.81	26	3 3/4	Rack.
26	Ienbach, Germany.	2.05	16	3 3/4	"

TABLE B.—RACK RAILROADS, ABT SYSTEM.

Number.	Name and location.	Gauge feet, inches.		Length.		Max. grade, per cent.	Sharpest curves.		Locomotives.						Mode of operating.	
				Rack.	Total.				Construction.		Number.	When built.	Weight, tons.	Tractive power, tons.		Train weight, tons.
		Miles.	Miles.				Adhesion.	Rack.	Rack.	Combination.						
1	Harz Railway, Brunswick, Germany.....	4 8 1/2	4.66	18.95	2 1/2	6	9° 45'	8° 45'	R. & A.	5 1884-5	61	13	148	Pushin		
2	Lechstein, Thuringia, Germany.....	4 8 1/2	0.81	1.68	3 1/2	8	11° 30'	11° 30'	R. & A.	1 1885	25	6 1/2	55	"		
3	Oertelsbruch, Germany.....	4 8 1/2	0.43	2.36	5	13 1/2	51°	17° 30'	R. & A.	1 1885	64	24	8	"		
4	Puerto Cabello, Valenzia, Venezuela, S. A.	6	2.36	2.36	8	12 1/2	22°	17° 30'	R.	3 1886	46	10	66	"		
5	Visp, Zermatt, Switzerland.....	3 3/4	4.66	2.17	2.8	22 1/2	22°	17° 30'	R. & A.	5 1889-90	32	10	50	Pulling		
6	Mt. Generoso, ".....	2 7/8	5.59	5.59	22	22 1/2	25° 30'	25° 30'	R.	6 1889-9	16 1/2	6	11	Pushing		
7	Rama, Sarajevo, Bosnia, Austria.....	4 8 1/2	11.12	42.25	1 1/2	6	14°	14°	R. & A.	8 1890	33	8	82 1/2	Pulling		
8	Eisenerz, Vorternberg, Styria, Austria.....	4 8 1/2	9.01	13.05	2 1/2	7	11° 30'	9° 45'	R. & A.	12 1890	61	13	132	Pushing		
9	Manitou, Pike's Peak, Colorado.....	4 8 1/2	9.32	8.80	25	16	16°	16°	R.	4 1890-2	25	12	70	"		
10	Transandinio, Chile, S. A.....	3 3/4	17.40	31.07	2 1/2	8	15° 15'	8° 45'	R. & A.	6 1890-1	46	9	66	"		
11	Diakopho, Kalavryta, Greece.....	2 5/8	2.24	14.29	3 1/2	14 1/2	61°	8° 30'	R. & A.	3 1890-1	17 1/2	5 1/2	17 1/2	Poling		
12	Rothhorn, Switzerland.....	2 7/8	4.66	4.66	25	25	25° 30'	25° 30'	R.	4 1891	18 1/2	8	10	Pushing		
13	Ghon, Naye, ".....	2 7/8	4.66	4.66	22	22	22°	22°	R.	6 1891	18 1/2	8	11	"		
14	S. Domingo, West Indies.....	2 7/8	3.98	22.37	4	9	33° 30'	17° 30'	R. & A.	4 1891	27 1/2	8	55	Pulling		
15	Mt. Salève, Savoy (electr.).....	3 3/4	5.59	5.59	25	25	51°	51°	R.	14 1891-2	7 1/2	3	11	Pushing		
16	Wami, Toze, Japan.....	3 3/4	5.28	12.43	2 1/2	6.7	6° 40'	6° 40'	R. & A.	4 1891-2	39 1/2	11	110	"		
17	Aix-les-Bains, Revard, Savoy.....	3 3/4	5.72	5.72	21	21	25° 30'	25° 30'	R.	8 1891-2	20	8	11	"		
18	Montserrat, Spain.....	3 3/4	4.97	4.97	15	15	22°	22°	R.	5 1891-2	18 1/2	8	10	"		
19	Schalberg, Austria.....	3 3/4	3.73	3.73	25 1/2	25 1/2	15° 30'	15° 30'	R.	3 1892-3	20	8	22	"		

having been that on the Manitou & Pike's Peak Railroad, April 4, 1890. The rack rail is made of two or more toothed bars, placed side by side, the teeth staggered and joints broken. The number and size of the bars depends on the pressure on the teeth, which in turn depends on the weight and speed of the train and the grade.

The chief advantages claimed by Mr. Schneider for the Abt system are:

Continuity of the rack, the joints being broken, hence constant accuracy in the pitch division of the teeth. Thus the motion is much smoother and quieter than on the ladder rack.

The Abt rack can be laid on all practicable curves, without the use of special segments; and the teeth on the curves soon wear to a perfect contact.

The durability is great. From the experience on the Harz railroad it is evident that with the present traffic there the rack teeth will wear 3/8 inch in 150 years and the cog wheels will last 12 years, but on the ladder racks the cog wheels will last but about two years.

The strength of the Abt rack may be increased indefinitely by increasing the thickness of the individual bars or adding to their number. The ladder rack can be increased materially in strength only with an increase of pitch, involving changes in the locomotives.

The staggered teeth make it possible for several to be in contact at once, making the running smooth and quiet and permitting higher speed than the ladder rack.

The paper contains profiles of several rack railroads, outline diagrams of a number of typical locomotives, a short description of the Harz engines and of the method of operating the road, and a summary description of the construction and equipment of a few other roads. Some figures of coal consumption and of other operating expenses are given, but the particulars are too few to make them of much value except as studied in connection with other information.

Bridge Foundations in Nova Scotia.*

One paper of the Engineering Congress, of much interest to railroad engineers and contractors, was the paper on "Bridge Superstructure and Foundations in Nova Scotia," by Martin Murphy, C. E.

In 1883 concrete was first used by the author as a substitute for stout masonry, at first sparingly and with hesitation, but later with much confidence. The use was prompted by the scarcity of material suitable for ashlar masonry, the cost of transportation, the lack of skilled

workmen and the rapidity with which concrete structures could be erected with ordinary labor. It was not expected that the use of concrete would be received favorably, and it was not. It was treated as an expensive innovation. Notwithstanding these attacks concrete piers were erected in the most exposed positions, in the midst of strong currents, without any external protection, where they were exposed to heavy ice floes, to blows from timber rafts, and in many instances to undermining by scour—with the most favorable results. These have endured changes of temperature from 15 deg. below to 90 deg. above zero (Fahr.), and there are so far no damaging effects upon them. Violent blows have struck more importantly upon concrete than upon masonry, and from its monolithic character it has been less liable to fragmentary slips or segregations.

There have been built 147 highway bridges of metal superstructure in Nova Scotia within the last ten years, resting upon abutments and piers of concrete. Forty-four of these have been in existence for periods of five years, and have withstood the influence of the turbulent tides of the Bay of Fundy, heavy drift ice and the extremes of climatic exposure. But one failure has been recorded, and that was no doubt owing to careless workmanship. Such good results have attended the employment of concrete in substructures that its use is being extended and adopted for the renewal of old piers, some of which have been so

abraded and displaced by clumps of moving ice that renewals in the interest of safety were necessarily imperative.

The author describes numerous instances where abutments and piers of concrete have been erected. He describes one in which the piers were encased by matrices of concrete to preserve ashlar masonry from total destruction. There were 8 piers and 2 abutments of free-stone, carrying 9 spans of iron lattice truss, 6 of which were 160 ft., the other three being smaller. The tides rose from 24 to 30 ft. and the abutments and the masonry had been for 10 years a source of annoyance and expense to the railroad company. The water penetrated the body of the masonry during high tide, and, not being able to escape as fast as the tide receded, was alternately frozen and thawed, which forced the face stones outward until the whole mass became so unstable as to necessitate immediate renewal. It was inclosed with a timber framework and completely enveloped in concrete, which proved a cheap and effective remedy. For the last four years it has withstood all such vicissitudes, and its present appearance gives assurance of future permanency.

The writer describes the construction of this work in the following language:

"The abutments and piers were built within a skeleton framework closely boarded against the face as the work proceeded upward. They were built of Portland cement rubble concrete, faced with Portland cement fine concrete. The facing of fine concrete was generally 6 in. in thickness, but varied to width of 9 in. in rapid currents, or where liable to more severe usage than is due to ordinary exposure. The Portland cement rubble concrete was composed of 1 part of clean gravel or small stones not exceeding 1 in. in diameter, 5 parts of large stones weighing 20 lbs. and upward, 2 parts of sand and 1 part of Portland cement. In mixing the concrete, the gravel, sand and cement were turned over three times while dry; water was then added and the materials again turned over at least three times and well agglomerated before being placed in the work. The gravel, sand and Portland cement for the fine concrete were first mixed, to form a matrix or body of concrete, and the large stones of the rubble concrete were placed therein by hand. These stones were placed end and upward, 2 to 3 in. apart, and the spaces between them grouted up solid with the matrix, to form a compact mass, and any holes or cavities in the works run full flush with Portland cement compo, consisting of 2

(Continued on page 625).

* Transactions American Society Civil Engineers, for International Engineering Congress, at Chicago, August, 1893.

* A comparison is invited with the concrete rubble masonry described in a recent issue of the *Railroad Gazette*, page 567.



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EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The half fare excursions from Trunk Line territory to Chicago continue to be popular and the New York Central, the Erie and the Pennsylvania have each taken over 1,000 of these passengers into Chicago on a single excursion. The number of passengers leaving New York by these trains has been between 200 and 300 in most cases, but the New York Central has done better than that several times and on Monday last its excursion started with 1,032. The Pennsylvania took about 3,000 through passengers into Chicago on Aug. 12. The general passenger business of the Trunk Lines seems to be keeping up pretty well. The discontinuance of four through passenger trains by the New York Central, coming, as it did, at the same time with retrenchments in other departments, which were due to the falling off in freight business, was counted as of more importance than really belonged to it. The fact is the New York Central had put too many trains on the time table. It advertises as many now, since the reduction, as the Pennsylvania, and, if we count the two Buffalo trains, more. Moreover, two of the trains that were taken off are still run several days in each week, but as sections of other trains. This is the most economical course, from the operating standpoint, and is the course which has been pursued by the Pennsylvania all along.

The Manhattan Elevated Railway Company has declined to undertake any extension of its lines, or other addition to its facilities, under the proposition of the Rapid Transit Commissioners. Naturally there is a good deal of the familiar talk about the general and particular wickedness of the Manhattan company, and at least one city officer now says that the city should build a system of railroads and operate them or lease them. Probably every intelligent person in New York is satisfied that the Manhattan company could not enter into any agreement now for the expenditure of a great deal of money within any definite time. The directors of that company would not do their duty to the owners of the property if they made such an agreement. The only question then is, who is responsible for having delayed the business until nothing can be done, and until improvement of the rapid transit facilities of the city must be postponed indefinitely, and until the money spent by the Commission is probably all lost? The first responsibility rests with the Commission itself, and with one or two members of the Commission, who, with unaccountable dullness or perversity, or both, refused to see the only practicable way out of the trouble. But the ultimate responsibility is on those citizens who, for one reason or another, resisted all efforts to solve the problem by extensions and improvements of the existing system. They now have the satisfaction of knowing that they have played into the hand of the Manhattan beautifully. That company remains master of the situation.

The Northern Pacific has at last gone into a receivership, as has been predicted for some time. An official

statement says that the application for receivership was a friendly one, and that it was treated as such by the management. The immediate reason given is that the decline in gross earnings was more than any railroad could stand long, and that the revenue would be insufficient to pay operating expenses and interest charges. This we can believe. Up to the end of the third week in July the gross earnings for the year were more than 11 per cent. less than for the same period last year; but that does not indicate the worst of the situation. The decline in earnings is increasing at a ruinous rate. The first three weeks of July they fell off 25.6 per cent. and nearly 29 per cent. of the entire loss from Jan. 1 to the end of the third week in July took place in the first three weeks of that month. But further, the first week in August the gross earnings declined 29 per cent., as compared with the same week in 1892. Meantime the interest and sinking fund charges accruing on and before Dec. 1 amount to about \$1,000,000, besides "other large sums of interest, etc." But beyond all this is the shrinkage in value of securities put up for loans and the inability of the company to increase the margin. The floating debt of \$11,000,000 was funded last May into collateral trust bonds to the amount of \$10,050,000, and is said to be now over \$1,000,000. It would be injudicious to attempt to make any estimate of the effect of this step on the fortunes of the company. Under the circumstances it was the only thing to do. There will doubtless be a reorganization and a scaling down of securities and fixed charges.

The abrogation of the lease of the Lehigh Valley to the Reading looks like a final breaking up of the combination of anthracite carriers which Mr. McLeod formed a year and a half ago. It is now acknowledged that the lease caused a loss to the Reading—a loss, however, which was to be made up, under McLeod's plan, by a rise in the price of coal. Of all the coal carriers the Lehigh Valley has the greatest number of individual operators, fully fifty per cent. of its traffic being furnished by these. A control of that road and a purchase of its individual and Lehigh company's outputs went far to establish the position which McLeod coveted for Reading. What the result will now be to Reading no one can tell. A new "deal" or a new plan of reorganization may come next. The breaking of the lease on a confession of indebtedness to the Lehigh Valley just after Reading's payment of the Lehigh dividend gives color to the strictures which have been passed upon the present management of Reading. The future of the Lehigh Valley is in some doubt. When the Reading receivers were appointed, and the rental was reduced from seven per cent. on Lehigh Valley stock to five per cent., it was stated by the latter road that a severance of relationship would be fatal to dividends. The Lehigh Valley has a large floating debt caused by building the line to Buffalo and for terminals. Its new properties have not yet begun to earn the interest on their cost, and in the present outlook for the anthracite trade nothing better can be expected. The agreement to purchase the output of individual coal operators at 60 per cent. of the tidewater price may be modified, but an agreement of some kind is essential if the whole trade is not to become demoralized. As in other business, the outlook for anthracite is not good.

The Signal and the Newburgh Accident.

The fatal train accident at Newburgh, N. Y., on July 13, wherein seven persons were killed and 21 injured, has been investigated by the New York State Railroad Commissioners and they find the facts substantially as heretofore reported. Donohue, the switchtender, neglected to see that the switch was set for the main track, and Dyer, the section foreman, is censurable for disconnecting the interlocking bolt whereby it was made possible for the switch to be set for the side track while the distant signal stood at "all clear." The Commissioners say that no recommendation is necessary. Sundry signal experts evidently dissent from this view, and we have received communications from two, J. W. Lattig and W. H. E., asking various questions, which may be summed up in the following:

1. How was it possible for the semaphore to show clear when train No. 1 passed it, if, as is customary in such cases, the semaphore was counterweighted to go to danger when its operating wire was disconnected?
2. If the semaphore was counterweighted, what prevented it from going to danger when disconnected?
3. If the wire was tied or the signal was in any other way fixed at safety, was not the person who so fixed it more responsible for the accident than any other?
4. Would not an electrical semaphore, distant switch signal, which could not have been disconnected or molested in any way without going to danger, have prevented the accident?

The semaphore was counterweighted, "as is customary in such cases," but the men who were repair-

ing the switch did not disconnect it from its lever. The interlocking apparatus was fixed to the ground stand, but the circumstances were the same as if, in an ordinary interlocking frame, the interlocking had been disconnected while the levers remained connected up.

The switch tender was under instructions to keep the signal at danger while any repair work was going on, but it appears that through a delay in fitting the interlocking bolt, after the new parts had been put in, the switch tender assumed that the work was finished when, in fact, it was not finished. Those who are best informed about the whole matter believe that the switch tender set the switch for the main track before he pulled the signal to "all clear" (about 11:45), and that it was set for the side track by some one else, presumably one of the trackmen.

The worst difficulty in preventing blunders of this kind is the inexperience of the men and the impossibility of giving them more experience. Donohue had but one facing point switch to attend to, and it required important repairs probably only once in two or three years. The section master probably had few signals of this kind to attend to. But in the absence of the education that comes from experience the best we can do is to aim at constant improvement of precept, and the commissioners would have done well to recommend a more precise formulation of the rules that should govern in such cases. In this as in other matters connected with signaling we can learn a point from the English, whose thirty or forty years' experience in this line has brought out every imaginable kind of knotty problem. The Clearing-House code gives two or three pages to this very matter of repairs. The rules require each job to be entered in the signalman's book, the repairman and the signalman signing their names to the statement. Here are some extracts from these rules:

RULES OF ENGLISH CLEARING-HOUSE CODE.

145. When any connection between a signal-box or frame and points requires repairs, . . . the signal fitters must, before commencing, acquaint the signalman in charge of the points with the nature of the work, and agree with him when it is to be done. After the work has been commenced, the signalman in charge of the points at which the fitters are engaged, must not allow any train or engine to pass such points, without having first communicated with the fitters and received information from them that the points are in a fit state for the train or engine to pass in the direction in which it is required to run. When the work is completed, the fitters must inform the signalman in charge of the points.

147 A.* While the work is going on the signalman must see that such signals as may be necessary are kept at "danger," and he must signal the trains past by hand signal.

149 A. When the interlocking of any lever is out of order, or when any point or signal lever . . . is defective and not working properly, . . . the distant signals applicable to the lines affected must be kept at "danger" by being disconnected from the levers by which they are worked, and must remain in that position until the defect has been made good and all is again in working order. . . .

As we have just remarked, the problem at Newburgh, and at hundreds of places on American roads, is to make men learn with thoroughness a rule which they have occasion to use only on rare occasions. The italics in rule 149 are ours. In view of the importance of these words, it would seem to be a good idea to have that rule printed upon a metal tag and attached to the distant signal wire near its connection with the lever.

It may be that the English are addicted to verbosity, and that their voluminous rules would not be any better for American railroad men than those we have, which have been formulated by men who exalt brevity as the greatest merit in this matter; we have heard it claimed that such is the case; but where is the evidence? When a man multiplies words he sacrifices clearness, nine times out of ten, and American railroad officers are not exempt from this disability. They are chary, therefore, about making experiments in the construction of rules. But our trans-Atlantic cousins have had as many centuries of experience as we in handling the Queen's English, and we may do well to study their style a little more, for the railroad service over there has some expert masters of the mother tongue.

The question whether a distant signal operated by electricity would be safer than a mechanical signal depends somewhat upon the practice in using the signals. In either case the interlocking would be thrown out of service, and as soon as that is done the habits of the human custodian become an element in the problem. Any electric current not working through the rails of the track would have to be operated through some kind of apparatus equivalent to mechanical interlocking. A rail circuit would nominally be an automatic tell-tale, but in practice it is just such a place as this—a switch—where the circuit is trans-

*An interpolated rule of the Great Western Railway; not in the Clearing-House code.

ferred from the rail to a wire, with connections substantially the same in principle as would be used if the signal were operated by a wire circuit instead of a rail circuit. As for the habits of attendants, it is impossible to place dependence upon anything less than strict and regular inspection, for it is possible to evade the requirements concerning safeguards, with any apparatus. Without careful instruction and inspection, men will become experts in the art of disconnecting locks of all kinds, and we have heard of cases of this kind with electric apparatus which were more flagrant than any we ever heard of where the machine was wholly mechanical. We have made this brief reference to our correspondent's question about electric signals because we desire to promote the use of electrical apparatus in this field in every legitimate way and therefore do not wish to appear to ignore the question; but it is to be remembered that the immediate problem in this case is to find out the safest method of operating the hundreds of mechanical signals which are already in use, and which cannot be replaced with electric apparatus on account of the much greater cost of the latter.

Government Inspection of French Railroads.

A new system of government inspection of the several great railroad systems of France has been adopted. In considering, it must be remembered that the government has paid a large part of the cost of the roads, and that it guarantees interest on the larger part of the capital contributed by the companies, and in order to know whether the companies are keeping their part of the contract, it is necessary that the government should have its own agents on the roads, with extensive powers, as, indeed, it always has had them. The new arrangement, however, is apparently the result of a suspicion that the companies needed closer watching than they have been getting. It provides that the inspection service of each great railroad system be committed to an engineer of the corps of Mines or of Bridges and Highways of the rank of Inspector-General, whose duty includes the supervision of the operation and the construction of the lines of the system. Under the orders of this Inspector-General are an officer of one or other of these corps with the rank of Chief Engineer, as inspector of plans and construction; another Chief Engineer as inspector of track and structures, a third as inspector of operation and train movement, and a fourth for general inspection. The first-named of these chief engineers acts as assistant of the Inspector-General, and takes his place when absent. He has charge of the inspection of the construction of all new lines, and especially of the plans for such lines, and of the auditing of the construction accounts, and must see that the company makes proper reports of such accounts.

The chief engineer in charge of track and structures has supervision of new construction and maintenance on lines in operation, and examines the accounts of the maintenance service.

The chief engineer for inspection of operation and train service supervises the technical operation, the shops, rolling stock and train movement on all lines in operation, and examines the accounts of these departments. The other chief engineer attends to matters not included in the above-named departments, and especially to the pension, provident and similar funds, to rates and contracts for division of traffic, and to economical questions which concern international traffic or competition between different routes of transportation. He exercises direct supervision of the book-keeping of the company, in so far as it is not done by the other chief engineers. He has one or more engineers as assistants with no specified duties.

The two chief engineers in charge of track and of operation, respectively, have under their orders district engineers, each of whom shall have 620 miles at least and 1,240 miles at most in his district. These will exercise direct supervision of the book-keeping of the local officers in charge of maintenance of road, train service and operation.

Under the orders of the inspecting engineers are supervisors of track and structures, who are recruited from that part of the Corps of Bridges and Highways below the rank of officers called *conducteurs*, who are a sort of foremen of construction. Similarly supervisors of operation and train service are recruited from a similar force in the Corps of Mines (which includes mechanical as well as mining engineers), or from the "conductors" of the other corps; also clerks of the two corps are employed as inspectors of accounts and supervisors of labor. The latter are to see that the requirements as to hours of labor and other conditions of the company's employees are executed. Superannuated foremen of round houses and locomotive engine men (that is, such as are entitled to retire on a pension) may compete for appointments as supervisors of labor.

The supervisors of accounts audit the receipts and expenses of all branches of the company's service. They will be recruited from the ranks of the two corps called "supervisors," and from employees of the railroad companies who have served at least two years as accountants.

A notable provision of the law is that no inspecting officer of the government may enter into the service of the company inspected by him for at least five years after his service as inspector on it. Similarly no government inspector who has been a railroad employee may serve as inspector on that railroad for five years after he leaves its service.

This measure has been urged by the radical deputies especially; it has been claimed for it that it will prevent improper charges for working expenses and other improper expenditures, and so reduce the amount which the state has to pay on account of guarantees. In some respects, however, it seems calculated to increase expenses and seriously to weaken the discipline of employees. It will be seen that it provides for a small army of government employees simply to inspect the work of the company's own employees. Some of our states have passed laws requiring a somewhat minute regulation of the railroads, but they have usually provided nobody to do the regulating except for a whole state one, two or three commissioners, usually wholly without railroad experience. The French have here at least shown a better apprehension both of the extent and of the character of the force required to do such a work.

Reduction of Expenses.

We gave in our last issue a brief general survey of what had been done toward reduction of expenses on the principal railroads in consequence of the stagnation of business, as gathered from press dispatches. We now add such items as have appeared since that time.

The Boston & Albany has taken off one through train each way and has reduced the time of clerks. The Philadelphia, Reading & New England has reduced the wages of telegraph operators 10 per cent. The New York Central has taken off some work trains. The New York, Lake Erie & Western has made further discharges of men from the shops at Susquehanna, Meadville and elsewhere and has also laid off a good many freight train men. This road has also closed 16 block signal towers on the Susquehanna division and 10 on the Delaware division, thus throwing 52 signal men out of work. The shops of the Central of New Jersey at Elizabeth run five days in a week, ten hours a day. Those of the New Jersey Southern at Manchester, N. J., employing over 200 men, have been closed for an indefinite time. The Baldwin Locomotive Works have notified the men who do contract work for them of a reduction in prices amounting to about 10 per cent. It is said that this will affect 3,000 men. The Dickson Manufacturing Company, of Scranton, Pa., has reduced wages 10 per cent. The Westinghouse Air Brake Company has made a reduction in hours at its shops and the Union Switch & Signal Company will run its shops only four days a week, eight hours a day. A dispatch from Carlisle, Pa., says that the Carlisle Manufacturing Company has shut down its car shops; about 500 men are idle. The Gilbert Car Works, at Troy, N. Y., have shut down. The Richmond & Danville has discharged about 50 men from the shops at Alexandria, Va., 50 at Atlanta and smaller numbers at other places.

On the Pittsburgh & Western a reduction of 20 per cent. in the number of men has been ordered in all departments and the civil engineer's assistants have all been discharged. It is expected that 500 employees will be suspended on this road. The Louisville & Nashville has notified trainmen that their pay will be reduced 10 per cent. on Sept. 1. The Georgia Railroad has taken off the fast passenger train between Augusta and Atlanta. The employees of the Ohio Southern have been notified of a reduction in salaries of 10 per cent. The Michigan Central has made a 20 per cent. reduction in the forces in some departments and it is said that several heads of departments will be retired. The Chicago, Milwaukee & St. Paul has asked the engine-men, firemen, trainmen and switchmen to send representatives to a conference at Chicago to talk about reducing wages. The Chicago Great Western has reduced the pay of all employees, except trainmen and shopmen, 10 per cent. The Great Northern has made a sweeping reduction in the pay of all officers and employees who are paid by the month or year. On salaries of \$5,000 a year and upward, 30 per cent.; \$2,000 up to \$5,000, 25 per cent.; \$1,200 a year or more, up to \$2,000, 20 per cent. less than \$1,200 a year, 15 per cent.

Officers of the Burlington deny that a through train between Chicago and Denver will be taken off; but another item, apparently authentic, states that trains 13 and 14, between Kansas City and Denver will be discontinued. The Union Pacific will take off one train each way between these cities. The Missouri Pacific has ordered a reduction of 10 per cent. in all salaries of \$100 a month or over. The St. Louis Southwestern shops at Pine Bluff, Ark., employing about 300 men, were shut down Aug. 11. The Gulf, Colorado & Santa Fe has made severe reductions wherever possible, and has closed a number of small stations. The Missouri, Kansas & Texas has discharged 500 men in Texas, mostly in the roadway department, and also a number of traveling agents; and it is said that the Burlington has dispensed with the services of Messrs. Wetherald and Warner, veteran traveling passenger men for that company. The Rock Island has taken similar action, and the Union Pacific has closed its Boston freight and passenger office, retiring Messrs. Condell and Newbegin. The Union Pacific will probably close other outside offices.

The Soo line has suspended about 250 men from the shops at Minneapolis. The Union Pacific has further reduced the time in its shops to 35 hours' work a week, and has discharged nearly the whole force in the Chief Engineer's Office.

The Southern Pacific has issued an order reducing the time in its shops to four days a week. The Northern Pacific will on Aug. 27 take off the through passenger train that began running June 5. The Pacific Mail Steamship Company caps the climax by notifying its employees that after Sept. 1 they will be paid in silver, instead of gold, which in some cases will mean to them a reduction of 50 per cent.

Tables of gross earnings for the month of July are published by the *Financial Chronicle* and by *Brad-streets*. It appears that the returns of 138 roads show a decrease of 4.11 per cent., 72 out of the total 138 showing decrease. Separate roads show losses reaching to 50 per cent., the greatest declines being in the roads running through the silver mining regions. The Illinois Central had a gain of \$234,000, the heaviest reported for the month, showing very strikingly the effect of the World's Fair travel on the revenues of that company. The figures of several other roads show increases in passenger earnings sufficient to counterbalance decreases in freight earnings. The earnings for the seven months—Jan. 1 to July 31—show an aggregate increase of three per cent. The chief causes assigned for the recent falling off in earnings are the diminished movement of wheat and other cereals except grain, and the decreasing shipments of all kinds of commodities.

One of the exhibits at the World's Fair, which is of special interest to engineers and concerning which we have heard many inquiries, is the collection of drawings prepared by Mr. Theodore Cooper as part of the Baltimore & Ohio Railroad Company's exhibit. These illustrate the history of American bridge building from 1804 to 1892, and a list of the drawings and photographs appeared in our issue of May 12, page 361. It is a real misfortune that the Baltimore & Ohio Railroad Company did not find room to hang the collection in the space allotted to its remarkable historical display. It was turned over to the Chief of the Transportation Department and has now been hung, in part at least, perhaps completely, in the gallery of the Transportation Building, where it may be found in B gallery, next to a Japanese exhibit which is in spaces Nos. 10 and 11. Although the visitor may now see the collection, we understand that there appears with it no statement of what it is or by whom it was prepared; moreover, it was not hung until after the Engineering Congress at Chicago. Many of the engineers who visited Chicago at that time looked for it in vain.

The British Board of Trade has finally received authority to regulate the hours of labor of railroad employees, the long pending discussion of the subject having resulted in the "Railway Regulation Act, 1893," which was passed on the 27th of last month. The provisions of this act are briefly as follows: If it is represented to the Board of Trade that any class of railroad servants, or any particular servant has to work excessive hours or does not have sufficient uninterrupted rest, the Board shall inquire into the matter; if it appears to the Board, either on such representation or otherwise, that there is reasonable ground of complaint, the Board shall order the road to submit to it such a schedule of time of duty as will bring the actual hours of work within reasonable limits; if the road fails to comply, the matter may be referred to the Railway and Canal Commission, which may repeat the compulsory process, and then if a road fails it is liable to a fine of £100 for every day during which the default continues. Both the Board and the Commission have power to rescind or vary their orders. The act does not apply to employees in the shops or those whose work is wholly clerical. The execution of this law will afford a very interesting experiment in the legal regulation of the details of railroad operation, for the regulation of hours is one of the most unmanageable of those details. The men desire to shorten their hours just as much as is possible without reducing the pay. The companies are averse to any shortening that is not absolutely necessary for safety, because it interferes with well settled divisions of the 24 hours and because any change is pretty sure to be made the successful pretext not only for such legitimate increases in the rates of pay per hour as the change demands, but for other increases as well. Either by urging sentimental reasons or by bulldozing of a more or less mild character, the men will secure advantages here and there. The public is interested, because, while the roads, in their strenuous endeavors to have the men work as many hours every day as their nerves will stand, may go a trifle too far, the people traveling over the road desire to have the doubt on the other side—desire to have the hours of signalmen, for instance, made a trifle too short in each case. (The signalmen have been the chief agitators for the law.) But some men complain of overwork if they work over eight hours, while others work with cheerfulness and apparent reasonableness ten hours at the same kind of a job, and it is almost

always hard to tell how much the simple fact of long hours had to do with any particular case of negligence or delinquency; any case, we mean, where the hours were within, say, 16 per day. The Board of Trade has used its persuasive powers upon the companies for several years past, and the publicity it has given to cases of long hours, discovered in investigating accidents, has doubtless had considerable to do with the amelioration of the conditions of work already; so that, in view of the difficulties we have mentioned, the question is whether compulsion, actual, threatened or perfunctory, will be of any more value than simple publicity and persuasion.

The railroad and terminal problem of New York City is the subject of a paper in the *Engineering Magazine* for August by Mr. W. N. Black, but he does not clear up the difficulties of the question. His general opinion is that in the means for handling long-distance freight traffic New York is fatally defective. More than 30,000 truck wagons, requiring \$25,000,000 of capital and imposing a yearly tax of \$50,000,000, are needed to carry on the commerce of the city. The municipal ownership of the submerged lands surrounding Manhattan Island has unquestionably given to the city those broad plazas along the water front, but these have usurped the ground demanded for storage warehouses and have driven all warehouses, whether storage or wholesale, to other parts of the district or to the interior. The objection of Mr. Black to the pier situation is, from a mercantile point of view, well taken. In such a great commercial city as New York, one where the traffic by ocean and river is of so much importance, there ought to be at least parts of the water front where the buildings and appliances for doing business could be located directly on the water with no street between. West street and South street skirt the shore for several miles. The existence of these streets is responsible for much of the excessive trucking whereby it seems really as if all New York's merchandise were in the streets. Such transfers by horses are very costly and must tell against a city's trade heavily. Then, too, the insular position, while it gives unequaled water privileges, precludes cheap transfers from surrounding railroads into the city. Mr. Black's remedy is a railroad in a tunnel, not only across to Jersey City and around the business water front of New York, but from Staten Island to Fort Hamilton, and thence through Brooklyn on the surface of the wharves, crossing under the Sound again to the main land at Port Morris. This would give a direct line from New England to New York, Philadelphia, Baltimore and Washington, to be sure; but how about the paying traffic to and from New England? He thinks that \$20,000,000 would put the New York water front in direct connection with the railroads to the West, while a bridge would cost \$100,000,000. Just at this point is the difficulty with the tunnel as a solution of the problem. We have never seen in print any reliable estimate of a tunnel scheme, giving cost in reasonable detail with the number of cars which could be moved at a given rental and cost of operation with profit enough to pay interest on cost of plant. We know several instances where such a calculation has been attempted, but not apparently with hopeful financial results. The cost of several tunnels (or one with several tracks) added to the cost of terminal grounds in the city would be so great that a heavy charge, probably prohibitive, would have to be put on the number of cars which could physically be moved and switched. Then would such a tunnel solve the other problem of bringing docks and warehouses together? Until such questions as these can be answered satisfactorily we fear "New York's commercial blight" will continue; at least until loss of business becomes a formidable alternative.

Schemes for a grand central passenger station for Chicago, where the through trains of the many roads centering there would arrive and depart, have taxed the minds of many men for some time past. The latest scheme made public is that advanced by Maj. J. G. Pangborn, the representative of the Baltimore & Ohio at the World's Fair and President of the Associated American Exhibitors. He proposes the covering of Jackson Park with storage and transfer tracks, and the use of the Exposition buildings for shops, storehouses and a central station. According to Major Pangborn "the existing terminal station in the grounds, at present the subject of much criticism, might become useful under this scheme; the Manufactures Building would make the finest and largest trainshed in the world; the Administration Building, an excellent general office building; the Transportation building a storage and cleaning shed for passenger cars; the Electricity Building a central station for the express companies; and the Mines Building for the general use of employees of the various departments. Further he would use the Machinery Hall for an engine-house till more suitable round-houses could be built." While any plan that will satisfactorily dispose of the buildings will meet the approval of the Exposition officials, the South Park commissioners are inclined to treat plans of this kind as visionary and with considerable contempt. Another plan for a central station has originated with Millard J. Scott, and for its consummation requires a sub-station at Grand Crossing, where passengers for the southern portion of the city

could leave the trains and proceed up town on the elevated or cable trains, and a grand central station at West Fortieth and Lake streets that would be the terminus of all through trains of all roads. The trouble with all these schemes is that they reckon without their host—the owners and the users of existing lines that extend to points nearer the center of the city. A road which takes through passengers to within half a mile of the business center has a tremendous advantage over one which drops them seven miles out, or even two miles out; and this in spite of the very best elevated or street service. This is illustrated in New York City. The New York, New Haven & Hartford has a line of its own to within 7½ miles of the City Hall, and would doubtless be glad to use it for through passengers, but the through trains continue to be run over the New York Central tracks to the old terminus, 3½ miles from the City Hall, though the elevated railroad connects with equal convenience at both places. The New Haven road would like to avoid paying track rental, but it cannot help itself. If the World's Fair buildings were durable structures, and Major Pangborn could compel all the railroads to go there, he might broach his plan to the present generation of practical men, but as it is, the reporters will be his most interested auditors.

Railroad men ought to see the visionary—or very premature—character of these schemes by a comparison with the costly nature of every change which has been made in the location of freight and passenger terminals. Moving a freight yard out a few miles adds greatly to the expense for yard engines and incidental services. Moving a passenger station out even a half mile always arouses strenuous objections and is submitted to by the public only when the absolute necessity of the change is so clear as to compel acquiescence. Getting around in a city is costly business, and every one aims to keep this cost at a minimum. The fact that a passenger can go from Jackson Park to the center of Chicago for five cents doesn't half meet the case. The time lost is an important element. Many people must go by some other conveyance than an elevated railroad or a cable car, especially those with baggage. A trade journal recently discussed one phase of this matter, wondering why it should cost fifty cents or a dollar to get a trunk to or from a city residence when its owner can go the same distance for five or ten cents, and the trunk can go a thousand miles for a dollar. The fact was overlooked that trunks do not lift themselves up stairs as do men and women, and that even if they did they would require a separate passageway. A truck-wagon, with a stout attendant, is one of our most valuable transportation facilities, and one which machine methods do not succeed in superseding very fast.

NEW PUBLICATIONS.

Colombia in 1893. By Climaco Calderón and Edward E. Britton; 24 State street, New York.

This is a handsome book of 122 pages based upon Bulletin No. 33 of the Bureau of American Republics, but containing many important additions both in later information concerning railroad development in Colombia and in illustrations of the people and country. These latter are beautiful mezzotints, and lend much interest to the book. It is divided into eight chapters, dealing with the physical conditions and resources of the republic, its political divisions, cities, history, institutions, and industries, constituting a valuable handbook. The importance of Colombia in the future development of South America is clearly pointed out, a circumstance which has been too generally overlooked by capitalists. Colombia has been called "the pivotal state" of the Latin Continent. It is one of the richest in natural resources of any country of equal area in the world, its valleys are fertile, and lead like natural avenues of trade toward the south. Thus they served for the great royal highway over which came the riches of Peru and Bolivia in the olden time, and so it seems they are destined to serve the growing commerce of the inter-Andean valleys in the time to come. Already one railroad is building into the Cauca Valley, and the Cartagena-Magdalena Railroad bids fair to soon divert Colombian trade to the ancient and admirable harbor of Cartagena. The construction of a system of roads, with Cartagena as their northern terminus, will grow out of the few short lines existing now, to which end the surveys just completed by W. H. Shunk, under the direction of the Inter-Continental Railway Commission, will prove of the greatest value. A more immediate increase of commercial activity is, however, to be looked for from the completion of the railroad from the upper Magdalena to Bogotá, under concession to American contractors, and from the continuation of the Medellín-Puerto Berrio line, under the direction of a London firm. Colombia seems at last to be entering the railroad era of her development.

Railroad Matters in Chicago.

Freight Traffic.—Without exception, freight traffic is very small. Returns of the Board of Trade show that during the past week 12 roads, centering here from the agricultural districts, brought in only 61,772 bbls. of flour and 3,706,000 bushels of grain against 111,321 bbls. of flour and 4,785,000 bushels of grain the corresponding week in 1892, and 74,500 bbls. of flour and 5,156,000 bush-

els of grain the same time in 1891. The shrinkage in other classes of inward freight was equally marked, and with the exception of wheat, the movement of which is lessened by the short crop, was entirely due to the scarcity of money which compelled city receivers to advise holding the property in the country on account of the inability to obtain funds with which to pay for it on arrival. The outlook for the closing quarter of the year was materially improved the past week by heavy and widely extended rains over the Illinois and Western corn belt, which, barring frost, insures a large crop; and, either in the crude state or converted into beef and pork, corn furnishes an immense item in the traffic for the Western railroads. Outbound freights of all descriptions fail to increase. The jobbing houses are practically idle. The following shows the receipts of flour and all kinds of grain delivered at Chicago the past week, and same time in 1892, by 12 railroads centering here from the interior, and amount by each road.

By—	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
No. West.....	Bbls.	Bush.	Bbls.	Bush.
Ill. Cent.....	11,800	412,000	14,637	508,254
C. & N. W.....	1,650	585,000	1,825	635,375
C. & R. I. & P.....	10,000	638,000	4,825	637,840
C. & B. & Q.....	11,100	782,000	19,299	922,190
C. & Alton.....	5,400	221,000	9,750	450,915
C. & E. Ill.....	300	207,000	252,425
C. & M. & St. P.....	14,250	208,000	20,875	408,020
Wabash.....	300	276,000	5,270	235,500
C. & G. W.....	6,000	138,000	34,232	178,020
A. T. & S. Fe.....	1,272	307,000	1,083	440,130
Wis. Cent.....	272	1,000	1,200	5,410
L. N. A. & C.....	31,000	80,865
Totals.....	61,772	3,706,000	111,171	4,774,974

Passenger Traffic.—There was considerable divergence in the statements of officers regarding the volume of passenger traffic. The Rock Island people said their business the first half of the week was the reverse of satisfactory, but a very marked improvement occurred the closing half, and they thought the aggregate might show a fair increase over the preceding week, but their trains were not running full, and they were not pleased with the outlook. The Assistant Passenger Agent of the C. B. & Q. said: "There has been a slight increase in the number of World's Fair visitors brought in since the first of the month, but the gain was not sufficient to compensate for the reduction in rates, therefore we have made less money than we did before rates were cut." He thought it barely possible that travel might increase during September and October, but was by no means sanguine. The St. Paul officers said there was no increase in travel, and they were not inclined to look for any. General Manager Earling said that he thought the majority of people were too poor to come, and that such were his advices from the interior. Other reports from different sections of the interior support Manager Earling's theory. On the other hand, however, the paid admissions at the Exposition for the six business days ending Aug. 12 aggregated 660,373, compared with 514,747 for the preceding week and 533,128 for the week ending July 29.

Retrenching Expenses.—The general managers of all the roads in the West continue their work of retrenchment. Among other questions of economy the general managers are discussing the cost of switching in the Chicago yards. This is a heavy expense to every road centering here, and plans are being matured for a thorough reform in the system, by which they expect to materially lessen the cost of handling trains. One General Manager said: "The cost of switching is a grievous burden on the roads, but it can be lessened by reforming present methods. For example, a switch engine leaves the Rock Island yards early in the morning with a train for the Burlington; it seldom gets back before eleven o'clock, and frequently not before noon. This is a great loss of time, and the same conditions prevail with all the roads. I think, however, that the changes now under discussion will, if adopted, save nearly 50 per cent.; at any rate, the curtailment will amount to a large sum during the year."

General Manager Earling, of the Chicago, Milwaukee & St. Paul, said: "We have taken off one through passenger train between Chicago and Savannah on the Mississippi River Division, also discontinued a number of short runs on unimportant branches, but they all count in expense items. We have also cut down our freight service nearly one-third. So far the wages of the employees have not been touched, but it looks as though an early move will be made by all the Chicago and perhaps Western roads for a 10 per cent. reduction. This question will come before the General Managers' Association at an early date. If the majority favor a reduction all will acquiesce. Then if a strike occurs the roads will act as a unit in meeting it. I think, however, that a large proportion of the men would prefer to accept reduced wages to seeing further discharges just now, and one of the two is imperative, as expenses must be brought down to conform in some degree with earnings."

At the office of the Chicago, Burlington & Quincy it was learned that aside from discontinuing one passenger train between St. Louis and Denver and some unimportant short trains, their passenger service had not been touched, but a heavy reduction has been made in freights. The discontinuance of the old limited passenger train by the Lake Shore created little surprise among those

who understand the situation. There was in fact little use for it after the "Exposition Flyer" was put on.

A meeting of the General Managers' Association has been called for the 17th inst. This is the first of a series of meetings to be immediately held to discuss subjects connected with railroad management, and the means by which savings can be made to the roads. Among the questions that will be taken up is the charge for freight car mileage. The question of wages will also be brought up. Many other economies must also be introduced, including consolidation of outside agencies. It will also be proposed to establish Managers' Associations in other territory.

CHICAGO, Aug. 14.

Bridge Foundations in Nova Scotia.

(Continued from page 621).

parts of sand and 1 of cement. The fine concrete facing was kept at least 6 in. higher than the rubble concrete, and united with it to form one homogeneous mass. In every instance the top of the pier was finished with fine concrete for a depth of 1 ft. 6 in., and the shoes of the iron truss posts were placed thereon without the usual bridge seats of stone.

The assumption that the bond between the large stones and the concrete is not so great as in the concrete itself is not an established one. Although tests by compression on small concrete columns give varying results, according to the kind of stone and other materials used, it is not difficult to observe that the planes of cleavage are in the concrete itself, and the results compared with those of similar tests on similar kinds of stone broken to the size of Macadam are not at all so much in favor of the smaller intermixture as would warrant the exclusion of the large stones. The employment of large stones in an economical sense will be determined by the supply available. Their adoption lessens the price of concrete more than 30 per cent. Ten 400-lb. barrels of Portland cement will build, on an average, 8 to 9 cu. yds. of concrete, and all the intervening mixture of concrete will be rich in cement. The cost of concrete work in Nova Scotia has been from \$5.50 to \$6.50 per cubic yard for piers and abutments, and from \$7 to \$8 for concrete work in arched bridges.

The concrete work forming arches of the small bridges was first built in courses radiating in the same manner as dressed stone in courses for archwork, so as to prevent any horizontal tendency to set flaky as the work went on. Each course was molded on the lagging of centers by securing thereon a board in the true radial line between soffit and extrados, and the concrete was placed there in its final position to form the course. When sufficiently set, the board was removed and placed again for the next succeeding course. A setting templet, the same as masons make use of when laying voussoirs or arch stones on centers, readily gave the inclination of the board. The foreman in charge was cautioned not to permit any course to be partially filled up and allowed to set before the whole was completed. Recently, however, the archwork was built *en masse*, an ample supply of material being first produced, and the work, once commenced, was proceeded with as rapidly as possible to completion.

The advantages of concrete masonry are that walls and bridges are produced which perform the service expected of them at much less expense than masonry; that by the utilization of materials otherwise valueless, such as the shingle of the beaches and streams, and the boulders encumbering the surface, permanent bridges can readily be built with the assistance of ordinary labor; that by the employment of concrete, limited means will yield more desirable results; that evidence exists that such adoption would secure at low cost works of great efficiency is sufficient to justify the use of concrete, as well as the introduction of the subject of its adoption here.

Contrary to the experience of some enterprising American engineers the writer declares that concrete work should not be proceeded with during the extremes of hot or cold weather, without protection from such extremes. He would require an even temperature of about 60° Fahr. for its manufacture and use. During summer heat the walls should be covered immediately after the introduction of the concreting material, and occasionally sprinkled over with a hose or through a finely punctured nozzle of a watering-can. He says that the injurious effects from freezing are still more to be avoided, that it is better to desist from concrete building early in the month of October, that it is requisite that the concreting process should go on with extreme slowness on the outer or exposed surface of concrete walls. The interior of the mass sets slowly; the induration should extend equally slowly in all directions so that the solidifying condition may be simultaneously reached throughout the body, and that the cohesive attraction and crystallization may be uniformly progressive.

The author describes several methods adopted under different conditions of river and sea bottoms, which he has employed for existing structures, one the Avon Bridge foundations, whose piers had for a foundation solid rock. The superstructure of this bridge consists of five pairs of steel cylinders 38 to 48 ft. in height. They are each 5 ft. in diameter and filled with concrete. The shells are $\frac{3}{8}$ in thick and are coupled together by laced beams and sway braces. What is especially interesting is the author's method of fastening these cylinders

to the bedrock. The columns rest upon limestone stone carboniferous and are secured to it by nine 2 in. rock dowels fitted and wedged into the rock and standing at a height from 2 to 4 ft. within the iron cylinder. The cylinder was then filled with concrete thus fastening the bolts or dowels securely within it and rooting, as it were, the columns to the bedrock. The author has adopted practically the same method with regard to piles on soft foundations, by driving the piles deep into the ground and then having several of them extend up into the cylinder several feet and filling in around them solid with concrete. The method employed for placing concrete under water between the iron dowels and piles was ingenious and successful.

Bags, made of rough brown paper well stiffened with glucose, were employed and slipped into the water over the required place of deposition. Each bag held about one cubic foot of concrete; smaller ones were used between dowels. The bags were quickly made up and dropped one after another, so that the one following was deposited before the cement escaped from the former one. The paper was immediately destroyed by submersion, and the cement remained; it could not escape. The bags cost \$1.35 per hundred, or 35 cents per cubic yard.

The same practice can be employed in from 15 to 18 ft. of water. With the help of a diver it can be carried on in greater depths. The writer claims that these means have been cheap and practical and effective, and the results have fully justified their adoption.

The remainder of the author's paper is devoted to the description of the use of concrete upon different footings and includes instances upon friable rockbed, rock partially covered with shifting sand, clay bottom intermixed with boulders, soft alluvial bottom, soft clay bottom and several conditions with caissons. He gives several instances where he has effectually contended with the mollusca, teredo, navalis, norvegica and the limnoria. An interesting feature of the paper is that the author gives the actual cost of many of these works.

The Second Decade of the Massachusetts Railroad Commission.

BY WM. A. CRAFTS, CLERK TO THE COMMISSION.

(Concluded from page 582.)

From the time of the first experiments in warming cars by steam from the locomotive, the Board has regarded that method with favor. Many years ago measures were adopted to make the methods of warming cars more safe, but the frequent holocausts attending collisions or derailments proved that all such measures were unavailing so long as fire was carried in the cars, and obtaining heat from the locomotive promised to accomplish a much desired reform. When Mr. Crocker became a member of the Board, the experiment has proved a success where it had been regarded with favor, and had been honestly tried; and new and improved systems of using the steam had been devised. Mr. Crocker took a special interest in the subject, and the Board now advocated the trial of this method of warming by the principal railroads. By its reports a public sentiment in favor of the improvement was aroused, but the innovation was strenuously opposed by some of the railroad managers as dangerous, too costly and inefficient. The constant efforts of the Board, however, supported by public opinion, gradually accomplished the desired result. At first a law was passed abolishing the common stove from all passenger cars, and requiring the companies to use only such method of heating as the Board approved. Hot water or hot air heaters only were approved for use in the cars, and the Board persistently advocated the use of steam from the locomotive. Finding this method "had come to stay," the companies gradually equipped their cars for steam heat, and finally a law was passed prohibiting the use of any heater inside or attached to passenger cars after Nov. 1, 1892, by any company unless specially authorized by the Commissioners. By that date all the principal roads had their passenger trains fully equipped for heating by steam from the engine. Two or three small and unimportant roads only were exempted from the requirements of the law.

The freight car coupler problem still remained unsolved, and the sacrifice of life and limb by the necessity of going between the cars to couple or uncouple them still continued. It was manifest that nothing could be accomplished by the legislation of the several states or by the probable concurrent action of the great lines of railroad through the Master Car Builders' Association; and after Congress had provided for national supervision of interstate railroad traffic, it was equally manifest that only through national legislation, if at all, could the adoption of a universal safety coupler be secured. This also was a subject in which Mr. Crocker felt a deep interest, as shown by his reports on freight couplers and freight train brakes, and under his lead the Board took measures to bring it to the attention of Congress. In the conventions of the State Railroad Commissioners at Washington he initiated and formulated action to secure the influence of the legislatures of the states upon their respective members of Congress, and even the recommendation of the President, for national legislation requiring uniformity and automatic action of freight car couplers, and, though humanity cannot be said to be a prominent motive for congressional action, the matter has been finally considered and

a law, not specially promising of early good results, has been passed. Much credit is due to Mr. Crocker and his colleagues for their persistent efforts in this direction. It may be truly said that the Massachusetts Commission did more than any other to organize and extend the agitation for the accomplishment of this reform through Congressional legislation.

Harmony in legislation on railroad matters by Congress and the several states was also advocated by the Massachusetts Board in the conventions of railroad commissions. The Commissioners of most of the Southern and Western States, however, were chiefly interested in the fixing of rates, the prevention of discrimination, local and personal, and the furnishing of ample and cheap facilities for the transportation of freight, subjects which were not of pressing importance in Massachusetts, and they felt but a languid interest in those questions which did not bear directly upon the objects they had in view. Something, however, was forcibly recommended by the report of the committee on the subject, of which Mr. Crocker was chairman.

In Massachusetts the Railroad Commission has supervision of street railways, except so far as they are necessarily under the control of municipal authorities, and of late years these corporations have required much attention from the Board. By the original general street railroad law the Board, after an examination of the assets and liabilities of a company, could authorize an increase of its capital stock, but there was no limit to the discretion of the Board as to the amount, and it had no authority to prescribe limitations as to the use of such increase. As the street railways multiplied and were not always organized on a sound basis, applications for increase of capital were more numerous. The opportunities for misuse or unsafe application of such increase, if the parties concerned were not prudent or scrupulous, seemed to the Board to require some restrictive legislation. Accordingly, the passage of an act was secured which provides that the directors of a street railway company being authorized by a vote of its stockholders may apply to the Board for authority to increase its capital stock, setting forth the purposes for which it is to be used, and after an examination of the assets and liabilities of the company and such further examination as it deems proper the Board, if the increase is consistent with the public interest, may authorize an increase, provided that the total capital stock and debt of the company does not exceed the value of its property exclusive of its franchise, and the increase shall be used only for the purposes named in the petition and set forth in the order granting the increase.

This legislation has had the effect of preventing to some extent an unwarrantable or unnecessary issue of street railroad stock, but some petitioners who could not fulfill the requirements of the law have found relief in a compliant legislature, and by special acts have evaded the restrictions of the general law.

Until 1889 street railroad companies had no right to issue bonds secured by a mortgage of their property, but there are cases where the right to do so would be not only an advantage to the companies, but a benefit to the communities they serve, by enabling them more readily to obtain the means to furnish the desired facilities. With this view the Board procured the passage of a law authorizing a company pursuant to a vote of the stockholders to issue bonds to be secured by a mortgage of its real and personal property, for the purpose of extending its road, purchasing real estate and equipment and other legitimate purposes, provided the Board of Railroad Commissioners, after an examination of its assets and liabilities, and such further examination as it may deem proper, shall find such issue consistent with the public interest. The Board is authorized to fix the rate of interest not exceeding six per cent.; but no issue of bonds can be authorized unless the property of the company, real and personal, excluding the franchise, on a fair valuation for railway purposes, equals or exceeds its outstanding capital stock and debt. In all applications for the approval of the issue of bonds the Board has insisted upon a compliance with the conditions imposed by the law; and, as in the case of increase of capital stock, some companies, unable to comply with these conditions, or fearful that the approval of the Board could not be obtained, have had recourse to the legislature. In the session just closed a committee, whose chairman was a street railroad owner, promoter and contractor, smoothed the way for an issue of bonds in such cases by reporting a special act on each petition. The loose provisions of some of these bills were fortunately remedied by amendments before they finally passed.

The multiplication of street railroads since the introduction of electric motive power, the consolidation of companies and the extension of tracks so as to compete with the steam railroads for considerable distances, and the incorporation of companies in other states with unlimited capital stock, to obtain control of the street railways in Massachusetts make the supervision of street railroads not the least important duty of the Board, and some serious questions of public interest and public safety are already disquieting conservative observers.

From the organization of the Board its influence has been directed against the crossing of railroads and highways at grade. The general law provides that no new railroad track shall cross an existing public way at grade, and no new public way shall cross an existing railroad track at grade without the consent of the

Board. Public sentiment, on which this law was based is opposed to grade crossings in the abstract; but the local sentiment of a neighborhood is generally in favor of its particular grade crossings.

While the Board has endeavored to restrict such crossings, it has sometimes, by reason of the pressure of local interests or the great cost of separating grades, violated its general policy and its better judgment. It has, however, refused its consent as a general rule, and by its well known views has induced the projectors of some new roads to avoid grade crossings where practicable. But the "Great and General Court" is always open to petitioners, and in one instance, where the Board had refused to allow a single grade crossing by a projected road, on the ground that by a slight change of alignment and grades they could be avoided, the legislature by one special act granted nearly a score.

The Board also early advocated the abolition of grade crossings where practicable, and in 1873 secured the passage of a law by which a municipality and a railroad company might agree to a separation of grades and have the cost apportioned by a commission appointed by the Superior Court. Something was accomplished under this law, but the number of grade crossings abolished hardly kept pace with the new ones established. As a measure of safety at grade crossings the Board was authorized some years ago, after a public hearing, to order gates or a flagman at any grade crossing, and at present a large number of the most dangerous crossings in the state, chiefly in populous districts, have that degree of protection against accident. Accidents, however, continued, often in spite of gates or flagmen, and the Board continued to advocate and public opinion demanded some measure for the abolition of the most dangerous grade crossings. The legislature in answer to this demand authorized the appointment of a commission of three civil engineers to investigate and report on the subject of the gradual abolition of grade crossings. The commission was appointed, made a careful examination of most of the grade crossings in the state, and submitted to the legislature an elaborate report with suggestions and plans for the accomplishment of the desired result. The report, though followed by no immediate results, prepared the way for legislative action the next year. Meanwhile the Board considered and reported on the subject of apportioning the necessarily great cost of separating the grades of railroads and highways. The corporations, too, were aroused to the expediency of yielding to public opinion as well as protecting their own treasuries thereby. In 1890 the matter came definitely before the legislature and a bill was reported and finally perfected in a conference of the legislative committee, the counsel of the principal corporations and the Board, and became a law.

Briefly this law provides that the directors of a railroad company or the authorities of a city or town may petition the Superior Court for the appointment of a special commission on the abolition of a grade crossing or crossings, which commission shall determine the manner of separating the grades at such crossing and by whom the work shall be done. The cost of the alteration is to be apportioned as follows: 65 per cent. is to be paid by the railroad company, not exceeding 10 per cent. by the city or town, and the balance by the state. Before the report of the commission is confirmed by the court, the Board must certify that the state's proportion of the estimated cost will not exceed the limit prescribed by the act, namely, \$500,000 per year for ten years. Upon confirmation of the report of the commission the work is to proceed. The original law provided that the grade of a railroad shall not be changed without the consent of the directors of the company, but it being found that this might prove an obstacle to some very desirable alterations, the Board of Railroad Commissioners as a disinterested body, was substituted for the directors. The law also provides for the abolition of grade crossings by agreement of the city or town authorities and the directors of a railroad company if approved by the Board after a hearing, 20 per cent. of the expenditure to be borne by the state and the balance by the parties according to their agreement. The foregoing are the essential features of the law, and it is unnecessary to mention the details by which its provisions are carried into effect. Under this law a considerable number of grade crossings have already been abolished, many more have been determined upon by the special commissions, and others still are pending before commissions or the court. Two special acts involving the principle of the general law have also been passed. One of these authorized a special commission already considering the abolition of one dangerous crossing to determine the manner of elevating the Providence Division of the Old Colony Railroad for a distance of about three miles in the city of Boston, thus avoiding about a dozen grade crossings, the cost thereof to be apportioned as provided in the act between the railroad company (which bears the greater part), the city and the state. The other was a similar law providing for the elevation of the main line of the Old Colony Railroad through a portion of the city of Brockton with similar provisions as to the apportionment of the cost.

Allike dangerous with the grade crossings of highways are the crossings at way stations from one side of the railroad to the other, which passengers are often obliged to use in order to take a train on the further track, and which the companies expect and invite them to use by

planking the roadbed and providing no other means of reaching the other side. The Board has frequently expressed its views adversely to the continuance of such passages over the tracks, and it has recommended practical methods of protection while they are continued. It has advised, and most railroads have a rule, that no train shall pass a station at which another train is stopping to receive or deliver passengers. Unfortunately, however, this rule is not always strictly observed. The Board has also recommended that gates be placed on the platforms of cars and kept closed on the side next to the opposite track.

For the purpose of showing what may be done for the protection of life and limb at highway grade crossings, and at way stations as well, the Board in 1883 procured an elaborate illustrated report by Professor Goering, of Berlin, on the law, rules and practice in Germany to secure safety to highway travelers and passengers at stations.* The police regulations in Germany are more stringent than our people are disposed to adopt, or willingly to submit to, but to a certain extent they may wisely be followed. But the separation of tracks at stations on all railroads of large traffic and frequent trains, with overhead or subway passages across them, is a measure that sooner or later must be adopted by railroad managers if they have any regard for human life, or the sovereign public will demand legislation to require the adoption of the safeguards advocated by the commission.

In 1892, in compliance with a resolve passed by the legislature, the Commission made an elaborate report on the zone system of railroad fares in Austria and Hungary, showing how such a system would affect fares if applied to Massachusetts roads. The report was prepared with great care from information obtained by the Commission from Austria, and was illustrated with diagrams which afford a comparison of the Hungarian system, as applied to the five main lines of railroad running out from Boston, with the existing fares on those roads. The report contains much information in respect to accommodations and service on the Austrian and Hungarian roads, which must be considered in any comparison of the systems. The conclusions of the report are that the public would not, on the whole, be benefited by the adoption of the zone system on Massachusetts roads, which afford better and more frequent service than those of Hungary, a greater average speed of trains and the transportation of 150 lbs. of personal baggage without extra charge as demanded in Hungary. The report is one of those interesting discussions of matters outside of the routine of its duties which the Massachusetts Commission has from time to time given to the general reader.

We have mentioned some of the more important subjects on which the Board has acted or made reports, decisions, and recommendations. But these comprise only a small part of its acts, ministerial and judicial, during the second decade of its existence. It has adjusted many differences between individuals or communities and the railroads without public hearings or reports, and it has performed many minor and special duties required by general or special laws. Its impartiality has seldom been called in question, and in its conduct and action it has commanded the respect of railroad managers, in spite of temporary irritation and difference of opinion, and secured the confidence of the public.

We conclude the history of the second decade of the Commission with the close of Mr. Crocker's service as Chairman. His term expired in July, 1891, and he was not renominated by the Governor, in the city of whose residence there was much opposition to Mr. Crocker because, adhering to the declared policy of the state, he had antagonized the creation of a grade crossing on a new and important avenue connecting the cities of Cambridge and Boston. The executive council repeatedly refused to confirm the nomination made by the Governor, and for several months the appointment remained undetermined. Under the law a commissioner remains in office until his successor is appointed and qualified, and Mr. Crocker accordingly continued to serve till February, 1892, when, unwilling to hold the place longer under such circumstances, he resigned. Hon. John E. Sanford was appointed in his place, and under his lead the Board is likely to maintain the reputation it has previously borne for ability, integrity and intelligent service to the public.

TECHNICAL.

Manufacturing and Business.

The Akron Tool Co., of Akron, O., is in receipt of orders from the Pittsburgh, Shenango & Lake Erie and the Alabama Midland railroads for the McNeil patent balanced, automatic dump, charging barrows to equip the coaling stations of the lines mentioned.

John C. Paul, receiver of the American Steel Wheel Company, announces that he will continue the new works of the company at Garwood, N. J., in full operation, and having greatly improved facilities is prepared to execute orders for solid steel locomotive driving wheels and wheel centres; truck, tender and passenger car wheels and solid steel castings for railroads.

The Gilbert Car Mfg. Co., of Troy, N. Y., closed its shops at Green Island early last week, although the company has orders for the Lake Street Elevated, of Chicago, and for other companies. The officers announced

* Twentieth Annual Report, 1889.

that the closing of the shops was due to the inability of the company to make its collections for cars delivered to the railroads. On Aug. 16 the Sheriff of Albany County took possession of the Green Island works.

The skylights for the new station and train sheds of the Boston & Maine Railroad on Causeway street, Boston, will be made of wire glass, which consists of a sheet of glass having imbedded in its centre a sheet of wire netting of any required size of mesh. The contract for furnishing these skylights was awarded last week to the American Wire Glass Manufacturing Co. of Philadelphia and the Manhattan Equipment Company of New York, selling agents. This order amounts to over 150,000 square feet of glass.

Iron and Steel.

The stockholders of the Pennsylvania Steel Co. voted this week to increase the company's bonded indebtedness from \$3,000,000 to \$9,000,000, in order to pay off the floating debt of the company. Arrangements have been made for the placing of a large amount of the bonds. They will be issued at once, and, when subscribed, the receivers will be discharged.

The Troy Steel & Iron Co., of Troy, N. Y., was placed in the control of receivers on Aug. 16. William Kemp, Vice-President of the company and James Keenan, of Troy, being named as receivers. This company has a capital of \$2,500,000, and its assets are given as \$1,300,000, the liabilities aggregating \$2,000,000. Messrs. Kemp, Rogers, Rockefeller, and Corning, directors of the company, are its principal creditors.

Chairman H. C. Frick, of the Carnegie Steel Co., Ltd., on Aug. 10, issued a notice that, taking effect Sept. 1, 1893, and applying to every officer and employee of this association, excepting those working under wage scales, the following reduction in salaries was ordered:

On salaries exceeding \$500 per month, 30 per cent.; on salaries \$400 and less than \$500 per month, 25 per cent.; on salaries \$200 and less than \$400 per month, 20 per cent.; on salaries \$80 and less than \$200 per month, 15 per cent.; less than \$80 per month, 10 per cent. "This action has been deferred as long as possible in the hope that some improvement in the existing trade depression might occur, but as the situation is daily becoming worse this reduction is found absolutely necessary."

New Stations and Shops.

The contract for building a car shop to replace the one destroyed by fire at Brainerd, Minn., has been awarded by the Northern Pacific to A. Tolefson, of Minneapolis. It is to be of brick 96 ft. x 280 ft. in dimension, with gravel roof, and is to be completed by Oct. 1. The contract for steam heating has not yet been let.

Work on the Spokane shops of the Great Northern is nearly completed. The contract for installing the steam-heating plant has been awarded to the W. F. Porter Steam Heating Company of Minneapolis. Nearly all the iron and wood working machinery for this plant has been purchased.

It has been decided to remove the car shops of the H. C. Frick Coke Co. from Morgan Station to Summit, W. Va. The shops will be enlarged and the lines of road extended. The Frick company now owns 5,000 open top cars. The new shops will be completed this fall.

The Shiffler Bridge Works of Pittsburgh, Pa., has taken a contract to build a new iron building 120 x 200 ft., two stories high, for the Reymann Brewing Company, of Wheeling, W. Va. The foundations have begun and the ironwork is being constructed in the shops.

Interlocking.

The St. Louis Terminal Railroad Association has awarded to the Union Switch & Signal Company the contract for putting up interlocking signals at the new Union passenger station in St. Louis.

Lake Street Elevated Railroad, Chicago.

This road after various vicissitudes for the past five years is fast nearing a finish, and a considerable portion is expected to be in operation within 30 days. The line will, when finished, be 7½ miles in length. Equipment has been purchased to the extent of 30 locomotives, and 150 coaches. The stations, although designed after those on the Manhattan road in New York, are claimed to have many improvements. The road passes through a densely populated portion of the city where the people are tired of the slow process of going to and from their business by the surface road which still adheres to horse power. It is unfortunate, however, that for the present at least, the eastern terminus will be several blocks distant from the business center of the city.

The "Campania" and "Lucania."

The "Campania" has been sent back to the docks for changes. She vibrates badly, either from want of structural stiffness or from faulty disposition of the engines, or both. It is said that the changes will take two or three months. Meantime the "Lucania," the sister ship, is also in dock. She ran into a dredger coming out of the Clyde and stove several plates. She is to sail for New York on her first trip Sept. 2.

Lock Gates for "Soo" Canal.

The lock gates at the Canadian canal at Sault Ste. Marie, for which the Dominion Government will shortly award a contract, include five pairs of gates. The pair of lower main gates are 45½ ft. high; the intermediate gate 27½ ft.; the upper main and guard gates are each 29½ ft. high. All the gates are to be strengthened by steel cross rods on the inside, to enable them to resist the

enormous water pressure. Except in the almost impossible event of all five sets of gates being at the same time so badly damaged as to be useless, it will always be practicable to pump out the lock to repair the valves or other lock mechanism. The specifications call for the construction of the gates proper and also of the attachments for the necessary machinery for their operation. It is likely the total cost of the gates placed in position will not fall far short of \$100,000.

THE SCRAP HEAP.

Notes

The Coatsworth elevator at Buffalo, N. Y. was burned down on the morning of Aug. 15; loss about \$750,000.

The division headquarters of the Chicago, Milwaukee & St. Paul at Van Horne, Ia., will be transferred to Marion, Ia.

Officers of the Western New York & Pennsylvania have arrested 69 tramps in the vicinity of Warren, Pa., during the past month.

Six locomotive runners of the Erie road have been arrested at Jersey City for running trains across streets faster than six miles an hour.

The Cleveland, Cincinnati, Chicago & St. Louis has lately put in operation an interlocking tower of 40 levers at Litchfield, Ill.

A passenger train on the Texas & Pacific road was robbed by eight masked men near Mansfield, La., on the night of Aug. 14. They did not disturb the express or mail car.

The city authorities at Savannah, Ga., have ordered trains arriving from Pensacola, Fla., where are said to be several cases of yellow fever, detained for quarantine examination.

The Neversink Mountain railroad, and one other electric car line, at Reading, Pa., have been obliged to stop running on account of the drought, their power being derived from a water wheel in a river which is also used to feed a canal.

The Union Pacific steamer "Annie Falon," plying in Snake River between Riparia, Wash., and Lewiston, Idaho, was wrecked by the explosion of its boiler, near Almota, Aug. 14; seven persons were killed and all on board injured.

The floods of Aug. 4 and 5 did a good deal of damage in Arizona and New Mexico, and trains on the Southern Pacific west of El Paso, Tex., had to be suspended four or five days. Excessive rains also did much damage in Colorado, and in the vicinity of Pueblo there were many washouts.

The shops of the Terre Haute Car Works, at Terre Haute, Ind., were burned on the afternoon of Aug. 10. The entire plant was destroyed, but the money loss is not stated. The concern went into the hands of a receiver about a month ago, but it was expected that a favorable settlement would soon have been made.

According to a press dispatch eight men "held up" an Ohio & Mississippi passenger train, on the night of Aug. 10, near North Vernon, Ind. Four of the eight bought tickets at Cincinnati for North Vernon, and on the train divided the tickets in halves and stuck them in their hats. Discovering the deception the conductor tried to collect cash fares, when revolvers were pulled and the double quartet began robbing the passengers. Several purses were secured. The robbers left the train at North Vernon.

The New York Central is having a prolonged contest with the hackmen at Niagara Falls. The competitors of the Miller-Brundage Coach Company complained of the exclusive privileges enjoyed by it and entered legal proceedings against the road. After considerable friction the railroad company finally ordered all hacks off its grounds on Aug. 10; but on the 12th the Miller coaches were again admitted to the grounds, it was said under a lease, but the outsiders again threatened war and it appears that the difficulty is not yet settled.

South American Notes.

Professor Pickering has determined the height of the peak of Aconcagua, Chili, to be 22,500 ft.

The concessionaries for the railroad from Junin to the Santa Catalina Nitrate Works, Chili, have obtained authority to build six branch lines to other nitrate works in the vicinity.

The Chilean Council of State Railroads has invited bids for 40 cabooses.

The question of the Misiones boundary between Brazil and Argentine will be referred to the arbitration of President Cleveland in February next.

Mr. Frank Parish, well known as a director in several Argentine railroads, is now making arrangements for undertaking the construction of a network of roads, aggregating a length of 770 miles, intended to open up the valleys of the Rio Colorado and the Rio Negro in that republic. These lines will be directly tributary to the Argentine Great Western Railroad.

The governments of Argentine and Bolivia have revived the scheme for constructing a railroad from Jujuy to Potosi. The distance is 300 miles. If this line were built, there would then remain only a few miles to connect the Argentine railroad system with the Antofagasta & Bolivian line, thus giving a trans-continental route by way of the highlands of Bolivia.

The inauguration of the new 4,000 ft. pier at Puerto Colombia on June 15 was the occasion of an extensive supplement by the *Correo Nacional* of Bogotá, from which it appears that the citizens of Barranquilla made holiday in fine Spanish fashion to celebrate the event. The work is indeed a most creditable performance and

will prove of great immediate importance to Colombian commerce. The pier will accommodate five ships alongside at a time. A tramway runs the whole length of the structure, and we understand that traveling steam cranes are also provided. It is estimated that the facilities are equal to the demands of 1,800 tons of freight a day. The pier is constructed upon screw piles, driven 13 ft. into the bottom. For a considerable portion of its length it was necessary to drill and blast receptacles for the piles through hard pan. Work on this structure was commenced on Jan. 14, 1891. The first steamer to use the pier was the 5,000-ton "Atrato," of the Royal Mail Steam Packet Co. Cargo was unloaded and delivered in Barranquilla, some 22 miles distant, the same day, whereas formerly this would have required three days. The only drawback to Puerto Colombia now is its exposed situation, which will prevent vessels using the pier in very stormy weather. The Bolivar Railroad, which is operated in connection with this pier, in anticipation of increased traffic, has ordered 50 new freight cars from the Jackson & Sharp Co., of Wilmington, Del.

Agreement with Employees on the Lehigh Valley.

The employees of the Lehigh Valley road, who have been complaining for some time, or ever since the Philadelphia & Reading leased the road, secured the following order from Vice-President Theodore Voorhees last week. The road has since been taken out of the hands of the Reading, but it is said that the agreement will stand. It is not stated wherein it makes any very important change in previously existing conditions.

From Aug. 1, the pay of locomotive engineers on the eastern division shall be \$2.70 per day, from promotion; during the second six months, \$3 per day; after the first year, \$3.25 per day; engineers in yard service, \$3 per day. Mine engineers will be classed as yard service, and work and gravel train engineers as road service and take road hours.

As far as practicable at terminal points, men shall be furnished to coal the engines and make up trains in station order.

All employees shall be regarded in line of promotion on their respective divisions. The rights of conductors shall begin from the date of their promotion.

Whenever a conductor or fireman shall leave one division of the road, of his own accord, to work on another division, he shall be considered a new employee, on said division, but should be transferred by order the same rights he possessed on the first division shall be maintained.

While strict discipline must be maintained among employees, arbitrary or dictatorial treatment will not be tolerated.

In making promotions where merit is equal, seniority shall have the preference.

Engineers and firemen who go out between 10 P. M. and 6 A. M. irregularly shall be called not more than one and a half hours before leaving time.

Crews shall be called as nearly as possible one hour before leaving time.

No conductor shall be required to take out more than one inexperienced brakeman on any train.

When conductors and firemen leave the service of the company, a letter shall be given to them, if they so desire, stating their time of service and the capacity in which they were employed.

At relay offices where two or more operators are employed, ten hours shall constitute a day's work for day operators; at other than relay offices where two or more operators are employed, twelve hours (including meal hours) shall constitute a day's work.

Employees on company's business, such as attending court or inquests, shall be paid their regular wages.

No employee shall be suspended without a hearing and investigation, and employees may have the privilege of calling in any actual witness of the offense. If found blameless they shall be paid in full for lost time. The time of suspension shall always be computed from the time the party was originally taken off.

Any employee dissatisfied with the decision of any official shall have the right to appeal to the general superintendent, after having first submitted his case to the division superintendent.

No employee shall be asked to make an extra trip after working 20 consecutive hours, without having at least eight hours' rest, except in case of a wreck or washout.

A provision that no employee shall be required to join the Reading Relief Association is also made, but it is now of no value.

Elevation of Pittsburgh, Fort Wayne & Chicago Tracks in Chicago.

The Pittsburgh, Fort Wayne & Chicago road has submitted to the city of Chicago plans for the elevation of the tracks of this company in the south part of the city. The plans were presented, through First Vice-President James McCrea, to the corporation counsel, the mayor and the consulting engineer of the city, a formal offer being made to elevate the tracks and requesting action in the matter on the part of the city.

The plan, in general, is to elevate the four main tracks of this company from a point 300 feet north of Twenty-third street southward to a point near South Park avenue, Englewood, a distance of about four miles; the tracks to be elevated 8 ft. on earth filling, with iron bridges on stone foundations over the streets crossed; and the transverse streets to be depressed 5 ft. The proposed agreement stipulates that the city pay all land damages; that certain streets between Twenty-second and Thirty-sixth be closed entirely, and that the sewers and water mains at specified crossings shall be lowered at the expense of the city. If the plans are accepted, the railroad company agrees to have the work completed in three years. The proposed plans will be recognized as being very similar to those adopted by the Illinois Central in elevating its tracks through that part of Chicago known as Hyde Park, where the tracks of the company cross streets leading to Jackson Park.

The only apparent opposition to the plans at present is on account of the requirement that the city pay the land damages to abutters on the streets near the railroad, and the cost of sinking the sewers and water mains, some of the aldermen being decidedly opposed to the city paying any of the costs incident to elevating the tracks. There will probably be no objections raised to leaving the tracks at the present level north of Twenty-third street, as the road runs along the river where there is no necessity for crossing.

Railroad Taxes in California.

The California Board of Equalization has completed the assessment of railroads, both regular and delinquent. There was a long discussion before the Board concerning the delinquent assessments for 1886-87. The taxes for those years have not been paid, but the question of their legality was not covered by the decision of the Supreme

Court, which only dealt with the six years preceding. It was finally decided to defer action in regard to these, but the following figures were given out as the reassessment for the six years ending 1885: For 1880, \$23,584,148; for 1881, \$23,584,148; for 1882, \$22,373,253; for 1883, \$23,175,188; for 1884, \$24,062,820; for 1885, \$23,910,097.

The assessment for the current year shows a total valuation of \$42,478,640. Among the items are: Central Pacific, \$13,000,000; Southern Pacific, \$16,000,000; Pullman Palace Car Company, \$123,040.

Pig Iron.

Since July 1, when we were making pig iron at the rate of over 8½ million tons, 56 furnaces have been withdrawn from production, reducing the make at the rate of about 2,350,000 tons. The iron producers of this country would doubtless be better off if this reduction had occurred earlier in the year. It was a financial mistake on their part to make over 4½ million tons the first half of this year. A rectification of this mistake by blowing out 24.4 per cent. of the furnaces in blast in one month seems also too drastic a measure, for the good of the consumers at least. In England the ironmasters have managed things better. There has been a much more gradual reduction of output, and if it were not for the coal miners' strike against a reduction of 25 per cent. in wages their iron trade would be in a very healthy condition.

Snow Sheds on the Great Northern.

The bids for building the snow sheds along the line of the Great Northern were opened last week and forwarded to St. Paul. Bids were received from Porter Bros., McKinstry, Burns & Chapman, San Francisco Bridge Company, Wood Bros. and Mathew & Craig. It is expected that the contract will be awarded in a few days, as the company desires to complete them before winter, if possible. The contract will amount to over \$400,000.

Seventeen Killed by a Train Accident in Wales.

A train on the Taff Vale Railway, running to Cardiff from Pont y Pridd, ran off the track on the evening of Aug. 12, while traveling rapidly around a curve, and fell down an embankment. Seventeen persons were killed and 40 injured.

Train Accident at Milton, Va.

The passenger cars of train No. 4 of the Atlantic & Danville road fell through a trestle bridge near Milton, Va., at 2 o'clock on the morning of Aug. 16, and six passengers and one trainman were killed and one passenger and three trainmen were injured. The reports state that the bridge was 60 ft. high, and that the failure of the bridge was probably due to the undermining of a foundation by a freshet.

LOCOMOTIVE BUILDING.

The Pennsylvania has put in service on its New York division six new class "P" engines with 78-in. driving wheels.

Two new locomotives have been constructed by the Kingston Locomotive Works for the Ottawa, Arnprior & Parry Sound road. One of the engines is a mogul freight engine, with 18 x 26 in. cylinders, and the other a heavy passenger engine.

The Rhode Island Locomotive Works have received an order from the Lake Street Elevated Railroad, of Chicago, for 15 more of the two-cylinder compound locomotives similar to the one described in the last two issues of the *Railroad Gazette*.

The Receiver of the Port Royal & Augusta has placed an order with the Richmond Locomotive & Machine Works for six locomotives to be delivered in September. Five of the engines will be 8-wheel passenger locomotives and the other will be a six-coupled freight engine.

CAR BUILDING.

The Billmeyer & Small Company, of York, Pa., have received orders for 40 more passenger cars. The full force is employed.

The Seaboard Air Line has recently built at its shops at Portsmouth, Va., 35 furniture cars, with a capacity of 60,000 lbs., for the Elliott Furniture Company, of Charlotte, N. C.

BRIDGE BUILDING.

Allentown, Pa.—The County Commissioners have awarded the contract for the superstructure of an iron bridge over a branch of the Saucon Creek below Friedensville to the Allentown Rolling Mills, for \$800. The total cost of the bridge, which is to be 55 ft. long and 18 ft. wide, will be about \$1,175.

Belair, Md.—The Wrought Iron Bridge Co., being the lowest of 14 bidders, has secured the contract to build the superstructure of an iron bridge at Noble's Mill, over Deer Creek. The company's bid was \$3,095.

Cohoes, N. Y.—Plans are being prepared for the construction of an iron truss wagon bridge over the Cohoes company's canal at Cortland street. The Hilton Bridge Co., of Albany, N. Y., will build the new structure.

Easton, Pa.—Matthias Bird, of Bethlehem, will build the new county bridge over the Monocacy Creek in Upper Nazareth Township, at his bid of \$464.

Harrisburg, Pa.—Surveys have been made for a new 60-ft. span county bridge over Powell's Creek, at Lyster Fording, in Halifax Township.

Kettle River, Minn.—The Edge Moor Bridge Works will soon begin the work of erecting a 170-ft. span bridge for the Great Northern, replacing the timber span. The timber approaches will not be replaced at this time. From the water to the top of the rail the distance is 134 ft.

Lackawaxen, Pa.—Preparations are now being made to replace the old bridge, No. 6, on the Delaware Division over the Lackawaxen River at Lackawaxen, with a new iron and steel structure.

Ligonier, Pa.—A new bridge is being erected over Mill Creek east of this town.

Little Rock, Ark.—The free bridge injunction suit in the Pulaski Chancery Court was decided last week in favor of the Commissioners. The petitioners sought to restrain the Commissioners from advertising for bids for the building of a free bridge across the Arkansas River at Little Rock, alleging illegality in the proceedings of the County Levying Court last fall. A demurrer

to the bill was sustained and the injunction denied, and bids will now be advertised for. The structure will probably cost \$300,000.

Louisville, Ky.—Sealed proposals for constructing and erecting two new drawbridges and one new fixed span over the Louisville & Portland canal, and the removal of old drawbridges, and the re-erection of one of them, will be received until Sept. 12 by Lieut. Hiram M. Chittenden, at Louisville.

Minneapolis, Minn.—Excellent progress is being made on the east side track lowering of the Great Northern. The bridges at Main, Third and Fifth streets, northeast, have been completed, and the one at Central avenue is now being erected. The difference between the railroad company and the city about the change in grade of the Broadway and Central avenue bridge having been adjusted, the work has been resumed on grading and masonry. Grading and masonry on the Como avenue southeast, the Twenty-fifth avenue northeast, the Seventh and Fourth streets northeast, is now under way. The iron work is on the way for the Second, Fourth and Seventh street northeast bridges. The Edge Moor Bridge Works have the contract for the iron and steel work of all these bridges.

The highway bridge crossing the tracks of the Great Northern and Minneapolis & St. Louis at Second street north is now being erected by the Gillette & Herzog Manufacturing Company of Minneapolis.

The Lake street bridge across the right of way of the Hastings & Dakota branch of the Chicago, Milwaukee & St. Paul and the Minneapolis & St. Louis has been completed. The Twin City Rapid Transit Company is preparing to operate its line to St. Louis Park over this bridge.

During the fire on last Sunday afternoon one span of the Plymouth avenue bridge across the Mississippi River gave way. This was caused by the action of the intense heat on the native limestone pier. The damage amounts to several thousand dollars and will be repaired at once.

New York City.—The Department of Public Works of the city of New York will receive tenders up to Aug. 29 for the construction of the Third Avenue bridge over the Harlem River, which we shall illustrate in a succeeding number. In these times, an item contract, involving little or no risk and with payment absolutely sure, is very desirable to contractors, of whom there are now many out of work. The value of the whole of this work is over one million dollars, of which about 30 per cent. is steel work, and the rest masonry, pavement, foundations, etc. Bids will be received from one contractor only for the whole work.

Pottsville, Pa.—The plans for the new bridge over the Reading tracks on Nichols street have been prepared. The structure will be an iron or steel one.

Rock Island, Wash.—The Great Northern has accepted the bridge across the Columbia River at this point from the Edge Moor Bridge Works, the contractors.

Shoemakersville, Pa.—Contracts were awarded by the Commissioners of Delaware County this week for the erection of an iron and stone bridge to cost \$55,000, over Ridley Creek at Shoemakersville, on the Providence road. The iron work will be constructed by the Berlin Bridge Co., of East Berlin, Conn., at a cost of \$43,700, and the stone work by Thomas Oliver, of Chester, at \$4 per cubic yard. The bridge will be 430 ft. long and 36 ft. wide.

St. Cloud, Minn.—The proposition to issue \$50,000 of bonds to be used in building a new bridge at St. Germain street was defeated. The city will now expend about \$15,000 in widening and rebuilding the present structure. It is to be extended from 16 ft. to 24 ft. and will then carry the cars of the electric line connecting St. Cloud and Sauk Rapids. Frank Smith, City Engineer of St. Cloud, is in charge of the work.

RAILROAD LAW—NOTES OF DECISIONS.

Carriers of Goods and Injuries to Property.

In Georgia it is laid down that goods received by a railroad company from a connecting line and carried over its own road are presumed to have been received as "in good order," if nothing appears to the contrary.¹

In Texas joint tariff rates adopted by connecting carriers, as required by the interstate commerce law, fixed a lower freight rate for narrow-gauge cars for use of railroads engaged in the carrying business than for those intended to be used for logging purposes. The Supreme Court holds that a bill of lading fixing the lower rate for cars intended to be used for logging purposes, procured through the shipper's misrepresentation that they were intended to be used in the carrying business, was not binding on the railroad company, and that it was entitled to recover the higher rate from the consignee, since it would be guilty of a criminal offense, under the interstate commerce act, in accepting a lower rate than that fixed in the schedule of rates filed with the commission.²

In the state of Washington it is held by the Supreme Court that a contract by a railroad company to transport for an agreed sum, paid in advance, chattels over its line, to a point on the line of another railroad company, with which it has no traffic agreement, does not bind the latter company, where it has no notice of the terms of such agreement; and it has a lien on such chattels for its own freight charges, and for freight charges advanced by it to a railroad company which transported the chattels from the line of the receiving company to its own.³

In Indiana a shipper of poultry agreed with the railroad company that, as a condition precedent to recovery for injury to the poultry, he should give notice in writing of his claim therefor to some officer of the company, or its nearest station agent, before the poultry was removed from the place of delivery and mingled with other poultry. The poultry was damaged by a delay in transit, but the shipper did not know the amount of his loss until he returned home and deducted his selling weights from his shipping weights. When he had ascertained the loss, and two weeks after the shipment, he notified the company thereof, by letter. The Supreme Court holds that there was evidence for the jury of a reasonable compliance by the shipper with the conditions of the contract.⁴

In Wisconsin plaintiff's horse was injured while passing through an opening under defendant's bridge, which opening had been used for some years by plaintiff for the passing through of stock without objection by defendant. The Supreme Court holds that such use was a mere license, which would not entitle plaintiff to recover such injuries.⁵

In Louisiana it is held that in an action against a railroad for the destruction of an orchard of fruit trees by fire, the measure of damages is not the cost of replacing the trees, and the value of the care and labor bestowed on the destroyed trees before the burning, but the value of destroyed trees at date of fire.⁶

In Minnesota it is ruled that a horse accidentally escaping from the owner's premises without his fault is not unlawfully running at large while proper efforts are being made to retake it; and the owner is not chargeable with contributory negligence if the horse is run over while thus at large.⁷

The Court of Appeals of Kentucky rules that where sparks from defendant's locomotive set fire to its depot, whereby plaintiff's storehouse was destroyed, the mere fact that the depot was covered with shingles is not, of itself, ordinarily evidence of negligence; yet when the building is so situated that it is frequently fired by passing trains, and the company knew of the combustible material of which the roof was composed, and that it had before been fired by sparks, if the company used a spark-throwing locomotive near such a roof, and fired it, the fire would be caused by negligence.⁸

In the same case it is held that if the fire spreads from the matter first ignited, the intervention of considerable space, or of various physical objects, or a diversity of ownership, does not preclude recovery by the party injured, or affect the company's liability for its first negligent act; and that it was not negligence for plaintiff to build his house near the track, though he knew it was more exposed to fire than if at a greater distance.⁹

The Supreme Court of Indiana holds that it is not contributory negligence for the owner of land adjoining a railroad to permit dry grass, etc., to accumulate thereon, which would spread fires negligently set by the railroad company.¹⁰

Injuries to Passengers, Employees and Strangers.

A Kansas statute permits the collection by railroad companies of fares in excess of the regular rates from passengers who have no tickets, but provides that the act shall not apply to any passenger taking passage from a station where the office was not kept open 30 minutes prior to the starting of the train. The Supreme Court rules that a company could not charge fare in excess of the regular rate where a passenger, deciding to continue his journey, got off at a station to buy a ticket, and waited at the window until the conductor shouted "All aboard," the agent in the mean while being busy on the platform handling baggage.¹¹

In Georgia the Supreme Court holds that a railroad company is not bound to keep a ticket office open each and every minute up to the time it may lawfully close the same, provided a reasonable opportunity is afforded all persons desiring tickets to obtain them; nor is a passenger bound to wait at a ticket office an unreasonable time for the appearance of the agent to sell him a ticket, or to call again and again at the office to procure one, provided, in good faith, and with due diligence, he endeavors to do so before the time for closing the office arrives; and in each case it is a question for the jury whether or not the parties have respectively performed the corresponding duties devolving on them, and it is not the province of the court to decide what particular facts will constitute negligence or diligence by either party.¹²

In Alabama a brakeman was found guilty of contributory negligence merely because he selected the more dangerous way of ascending a car, where the killing was caused, not by the way selected, but from a defect in the car.¹³

In the Federal Court it is laid down that a railroad employee of long experience, who is injured while coupling cars in obedience to the orders of his immediate superior, cannot recover, merely because that duty is outside the scope of his employment, when he makes no objection to performing it, and there is no threat of dismissal in case of refusal.¹⁴

In Virginia it appeared that plaintiff, a brakeman, on going between two cars that were attached to an engine, to take out the coupling pin with his hands, though provided with a stick for this purpose, had his hand jammed by the sudden backing of the engine at a signal from his fellow brakeman. Plaintiff had been taught, and had declared that he fully understood, a rule of defendant that brakemen were prohibited from uncoupling cars except with a stick, and must not go between cars for coupling or uncoupling when an engine is attached to such cars. The Supreme Court holds this evidence insufficient to warrant a verdict for plaintiff, his own negligence causing the injury.¹⁵

The Supreme Court of Indiana rules that the fact that a city ordinance forbids the running of trains in certain parts of the city in excess of a certain rate of speed does not authorize the railroad company to run its trains in parts of the city not specified in the ordinance "at any rate of speed necessarily required by the business of the company," as it is the duty of such company to run its trains in a city in such a manner as to have due regard to the safety of the people who cross its track, according to the circumstances of each case.¹⁶

In Alabama the Supreme Court holds that in an action for the death of a person walking on a railroad track, where the track was defendant's main line, and it did not appear that it was in a public street, and so incorporated with it as to form part of the roadway itself, deceased was a trespasser.¹⁷

In New York it is laid down that though laws 1850, c. 140, requiring the whistle to be sounded and the bell rung when a train approaches a crossing, has been repealed by laws 1886, c. 593, it is yet the duty of railroad companies to cause some signal to be given when their trains approach a crossing.¹⁸

In Mississippi it is held that though railroad companies are allowed by statute to run their trains in towns at the rate of six miles an hour, yet it is a question of fact, determinable by circumstances, if this speed is consistent with due caution.¹⁹

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Maine, 3 per cent. on the preferred stock, payable Sept. 1.

North Pennsylvania, quarterly, 2 per cent., payable Aug. 25.

Wheeling & Lake Erie, quarterly, 1 per cent., on the preferred stock, payable Aug. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 20.

Iowa Central, annual, New York City, Sept. 8.

Toledo & Ohio Central, annual, Toledo, O., Sept. 4.

Wabash, annual, St. Louis, Mo., Sept. 12.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Roadmasters' Association* will hold its annual convention at the American House, Boston, Mass., Aug. 16 and 17. The programme of this meeting was published Aug. 4, p. 595.

The *Roadmasters' Association of America* will hold its annual meeting at Chicago on Sept. 12, 13 and 14. The headquarters will be at the Southern Hotel, Twenty-second street and Wabash avenue. The meetings will be held at Metcalf Hall, No. 137 Twenty-second street.

The *American Association of General Passenger and Ticket Agents* will hold its next annual convention in Milwaukee, Wis., Sept. 19.

The *Railway Freight Claim Association* will hold its next annual convention at the Hotel Cadillac, Detroit, Mich., Aug. 9.

The *Master Car and Locomotive Painters' Association* will hold its next annual convention at Odd Fellows' Hall, Milwaukee, Wis., Sept. 13, 14 and 15. The headquarters of the Association will be at the Kirby House, corner of Mason and Water streets. The programme of this meeting was published in our issue of July 28, p. 575.

Roadmasters' Association of America.

The eleventh annual meeting of the Roadmasters' Association of America will convene in Chicago on Sept. 12, 1893, and will continue in session three days. Committees have been appointed and reports will be submitted on the following subjects:

(1) Revision of Constitution and By-Laws, I. O. Walker, Chairman; (2) How to Take Care of the Right of Way and Fences, D. McEntaffer, Chairman; (3) Brotherhood of Section Foremen, Martin Palmer, Chairman; (4) New Track Appliances at the Columbian Exposition, J. B. Moll, Chairman; (5) Economy in Track Work, I. O. Walker, Chairman; (6) Terminals, H. L. Fry, Chairman; (7) Sub-Drainage, C. E. Jones, Chairman; (8) Track Joints, R. G. Ward, Chairman; (9) New Signaling Appliances (Paper), E. R. Kite, Chairman.

Papers will also be presented in competition for a prize of \$200, offered by the *Railway Age*. A full attendance of the members is requested. Every man in active charge of a general division of track is eligible to membership and is invited to be present, join the association and participate in its proceedings.

The Committee on Arrangements, of which Mr. J. B. Moll is Chairman, has selected the Southern Hotel, corner Twenty-second street and Wabash avenue, as headquarters of the Association. The Glenarm Hotel, corner Twenty-second street and Indiana avenue, has also been secured in case the Southern Hotel should not afford sufficient accommodations. Meetings will be held in "Metcalf Hall" at No. 137 Twenty-second street.

No arrangements will be made by the Association for transportation for members, as it is considered impracticable to do so. H. W. Reed, Waycross, Ga., is President of the Association and W. W. Sharpe, of Waycross, is Secretary and Treasurer *pro tem*.

PERSONAL.

—Mr. E. W. Jackson, Second Vice-President and General Manager of the Mexican Central Railroad, has been granted a four-months leave of absence.

—The office of Mr. H. B. Patton, Division Engineer for the Wyoming Division of the Union Pacific with headquarters in Cheyenne, has been abolished.

—Mr. C. L. Nichols has been appointed Superintendent of the Illinois Division of the Chicago, Rock Island & Pacific road, with headquarters at Blue Island, Ill. He succeeds Mr. C. L. Ewing, resigned.

—Mr. G. S. Reid, of Salt Lake City, has been appointed Auditor of the Texas Midland Railroad, to fill the vacancy caused by the resignation of Mr. W. E. L. Pearce.

—Mr. Theodore Voorhees, Vice-President of the Philadelphia & Reading, has been appointed Acting General Manager of the Lehigh Valley system, and will continue to have supervision of the operations of the road as heretofore, during the lease to the Philadelphia & Reading.

—Mr. S. Marsh Young, General Agent of the Hall Signal Company, now has his headquarters at the New York office, and Mr. W. W. Salmon has been appointed Western Agent. The Western office of this company is at 927 The Rookery, Chicago.

—Mr. Daniel J. Loden, of Baltimore, for a number of years private secretary to Mr. Robert Ganett, and during the latter's Presidency of the Baltimore & Ohio Railroad, is now Chief Clerk to Frank R. Biedler, Vice-President of the Baltimore & Drum Point Railroad.

—Mr. T. J. Moss, President of the Tennessee Midland and Paducah, Tennessee & Alabama roads, died at his home, in St. Louis, last week, aged 35 years. He was a well known railroad contractor, and was President of several river transportation companies as well as of the railroads above named.

—Mr. John Taylor, who became General Traffic Manager of the Philadelphia & Reading soon after the lease of the Lehigh Valley, has resigned his connection with the Philadelphia & Reading, and returned to his former position as General Traffic Manager of the Lehigh Valley road.

—Mr. C. G. Waldo, Assistant to the President of the Cincinnati, Hamilton & Dayton, has been appointed General Superintendent of the road, to succeed Mr. Charles Neilson, resigned. Mr. Waldo was formerly Purchasing Agent of the road, and in August, 1892, became Assistant to the President.

¹ C. R. & B. v. Bayer, 16 S. E. Rep., 353.
² M., K. & T. v. T. C. Lumber Co., 21 S. W. Rep., 290.
³ Moses v. Port Townsend S. R. Co., 32 Pac. Rep., 488.
⁴ N. A. & C. v. Steele, 33 N. E. R., 236.
⁵ Trux v. C. St. P. & O., 53 N. W. Rep., 842.
⁶ Stoner v. T. & P. Co., 11 South Rep., 875.
⁷ Nelson v. G. N. Ry., 53 N. W. Rep., 1129.
⁸ C. N. O. & T. P. v. Barker, 21 S. W. Rep., 347.
⁹ C. N. O. & T. P. v. Barker, 21 S. W. Rep., 347.
¹⁰ C. & E. R. Co. v. Smith, 33 N. E. Rep., 241.
¹¹ A., T. & S. F. v. Hogue, 31 Pac. Rep., 698.
¹² Cent. R. & B. Co. v. S. Rickland, 16 S. E. Rep., 352.
¹³ L. & N. R. Co. v. Pearson, 12 South Rep., 176.
¹⁴ Hogan v. Nor. Pac., 33 Fed. Rep., 519.
¹⁵ R. & D. v. Pannill, 16 S. E. Rep., 748.
¹⁶ C., St. L. & P. v. Spilker, 33 N. E. Rep., 280.
¹⁷ L. & N. v. Hayston (Ala.), 12 So., 299.
¹⁸ Friess v. N. Y. C. & H. R., 22 N. Y. S., 104.
¹⁹ L. N. O. & Tex. v. French, 12 South Rep., 338.

—The Receivers of the Northern Pacific are: Mr. Thomas F. Oake, President of the company; Mr. Henry C. Payne, of Milwaukee, an attorney of high standing and for many years counsel of the Chicago, Milwaukee & St. Paul, and Mr. Henry C. Rouse, Chairman and President of the Missouri, Kansas & Texas.

—Mr. Jefferson Justice, formerly Auditor of coal freight receipts for the Pennsylvania Railroad, has been appointed to the position of Auditor of freight receipts made vacant by the death of Mr. George M. Taylor. Oscar Knipe, Assistant Auditor of Disbursements, takes the position made vacant by the promotion of Mr. Justice. These appointments take effect Sept. 1.

—Mr. Alfred White, freight agent of the Lehigh and Wabash Companies Dispatch Transportation Co., died at his office in Milwaukee, last week, of apoplexy. Mr. White was at one time traffic manager of the Detroit, Grand Haven & Milwaukee road, and was afterward general Western manager of the Wagner Sleeping Car Company at Chicago.

—Mr. W. S. Hodges, General Freight Agent of the Wiggins Ferry Company, which operates a car transfer ferry across the Mississippi at St. Louis and several connecting railroads in St. Louis and East St. Louis, has resigned that position to give his entire time to the Mississippi River & Bonne Terre Transportation Co., of which he is Secretary and Treasurer.

—Mr. Charles Neilson, General Superintendent of the Cincinnati, Hamilton & Dayton, resigned that position this week. Mr. C. G. Waldo has been appointed his successor by General Manager W. M. Greene. Mr. Neilson has been General Superintendent of the road for several years. He went to the Cincinnati, Hamilton & Dayton from the New York, Lake Erie & Western. He had been Division Superintendent on that road.

—Mr. Charles S. Lee, General Passenger Agent of the Atchison, Topeka & Santa Fe for the Colorado Midland Division, with headquarters at Denver, and Mr. C. F. Zimmerman, Colorado Freight Agent of the same company, have resigned and both offices have been abolished. Mr. Lee was General Passenger Agent of the Colorado Midland before it was merged with the Atchison system.

—Gen. W. P. Innes, who served a term as Railroad Commissioner of Michigan in 1883 and 1884, died at Grand Rapids, Mich., recently. General Innes was a civil engineer, and was engaged in the building of the Detroit, Grand Haven & Milwaukee road, in Grand Haven, and made the preliminary survey of the Grand Rapids & Indiana railroad, north to Mackinaw. He commanded a Michigan regiment during the Civil War, and after the war he was manager of several railroads in Tennessee.

—Mr. James F. Morrison, until recently Supervisor of Trains on the Chicago & South Side Rapid Transit Railroad, has been appointed Superintendent of the same road, Mr. A. J. McBlair, the former superintendent, having resigned. Mr. Morrison began his railroad career on the elevated roads of New York City. At the opening for traffic of the "Alley L" he was appointed Train Dispatcher, and subsequently became Supervisor of Trains, a position corresponding to Train-master on other roads.

—Mr. G. B. Gordon, Civil Engineer of the expedition of Archaeology and Ethnology to Honduras, which left for that country last November, returned last week after several months' work in the mountains, at the ruins of Copan. Mr. Gordon brings with him 200 cases of relics excavated, and molds and models of monolithic idols, together with carefully prepared maps of the ruins. Mr. Gordon was the only American who remained after quarantine went into effect, he having remained to complete the work. Fears were entertained that he had succumbed to fever or the treachery of the natives, and his return will relieve the minds of those who planned the expedition.

—Capt. B. R. Dunn, Engineer of Roadway of the Atlantic Coast Line, died last week at Glen Lyn, a summer resort in Virginia, where he has been staying for the last four months. Captain Dunn suffered from pulmonary consumption and for the last two years had spent a part of each winter in Florida, and the summer in the mountain regions of Virginia. Captain Dunn's first railroad service was on the Chesapeake & Ohio, and then he became roadmaster of the Petersburg road, and afterward its superintendent. From that road he went to the Charlotte, Columbia & Augusta road, now part of the Richmond & Danville. He has been connected with the Atlantic Coast Line system for the last eleven years as Engineer of Roadway, with headquarters at Wilmington, N. C.

—Mr. Cornelius Shields, General Superintendent of the Western Division of the Great Northern, has resigned, and it is reported has accepted a position on a road in Illinois. He is 37 years old, and has been in the railroad service ever since 1871, 22 years. As a boy of 15 he carried water to a tracklaying crew on the Southern Minnesota railroad, which afterward became the Chicago, Milwaukee & St. Paul. The following year he was a section hand. Then he was a telegraph operator one year and a station agent six years and a half. Subsequently he became a train dispatcher, and was chief dispatcher a year longer. During the time between 1871 and 1882 he had given the same road the benefit of his continued service. Then he became Chief Train Dispatcher of the Canadian Pacific, and was Assistant Superintendent of the Western Division of the same road, making his headquarters at Medicine Hat, in the Northwest territory. He was General Superintendent of the Chicago, St. Paul & Kansas City road from 1888 until 1892, and has since held his present office.

—Mr. Henry S. Drinker, assistant to President Harris, of the Philadelphia & Reading, and formerly General Counsel of the Lehigh Valley, will return to the latter company, and there are numerous other changes that will occur. The officers of the Lehigh Valley, who accepted positions with the Philadelphia & Reading after the lease, will resume their old duties with the Lehigh Valley, among these officers being Isaac McQuilkin, formerly Comptroller of the Lehigh Valley, now Assistant Comptroller of the Reading; George S. Taylor, formerly in charge of the Lehigh Valley's coal business, now Assistant Coal Freight Agent, and William C. Alderson, formerly Treasurer and Purchasing Agent of the Lehigh Valley, now Assistant Purchasing Agent of the Reading; E. B. Byington, formerly General Passenger Agent of the Lehigh Valley, is now General Western Passenger Agent of the Reading system at Buffalo. He will, it is thought, retain this position for the Lehigh Valley, while A. W. Nonnemacher, formerly General Ticket Agent, now Assistant Passenger Agent of the Reading, in charge of the Lehigh Valley business, will probably be made General Passenger Agent of the Lehigh Valley.

—Mr. Thomas D. Messler, Third Vice-President of the Pennsylvania lines west of Pittsburgh and President or Vice-President of a number of the smaller corporations of the system, died at Cresson, the summer resort on the Pennsylvania Railroad, on Aug. 11. His death, which had been expected for several days, was directly due to heart failure. He had been suffering from a complication of diseases, and for four years past he had been in ill health. Mr. Messler was born in 1834 at Somerville, N. J. He entered the railroad service in August, 1853, in the Auditor's office of the New York & Erie Railroad. In 1856 he became Secretary of the Pittsburgh, Fort Wayne & Chicago, in which position he remained until made Auditor of the same line, continuing in that capacity until May, 1862, at which time he was promoted to the office of Comptroller. Afterward he was made Assistant President of the road, and from April, 1871, to April, 1876, was Comptroller of the Pennsylvania Company, and also of the Pittsburgh, Cincinnati & St. Louis. In May, 1876, he became Third Vice-President of the Pennsylvania Company, which position he held at the time of his death. He was also Comptroller until about four years ago. For many years he was President of the St. Louis, Vandalia & Terre Haute, Vice-President of the Cincinnati & Muskingum Valley and other roads.

—Mr. Charles G. Eddy, formerly Vice-President of the Philadelphia & Reading, was found dead in Washington Park, Chicago, on Aug. 10, and the coroner's jury gave a verdict that he died from self-inflicted wounds. No reason has been assigned for the act. Mr. Eddy had been living at Chicago for the last two months.

Mr. Eddy was born in Richfield, N. Y., in 1841. He began his railroad career as a clerk in the freight office of the Milwaukee & Chicago, at Milwaukee, a position which he retained until 1862. In that year he enlisted in the army. After the close of the war he became chief clerk in the freight office at Milwaukee of the Chicago & Northwestern until 1868, when he became General Agent of the Lake Superior & Mississippi Railroad. He left this company in 1870 to take the agency of the Central Vermont Line at Duluth, returning in 1871 as General Agent to the Chicago & Northwestern at Council Bluffs, Ia., and Omaha, Neb. From Nov. 1, 1873, until 1879, he was the Assistant General Freight Agent, being advanced in the latter year to General Freight Agent, and in January, 1883, he became General Eastern Agent of the Missouri Pacific, with headquarters in New York City. In September of the following year he accepted the position of Freight Traffic Manager of the West Shore Railroad. Mr. Eddy left the West Shore service in 1885, and on Nov. 1 of that year became Vice-President of the Norfolk & Western Railroad, in charge of both its freight and passenger traffic. A few weeks before the Philadelphia & Reading Railroad went into the Receivers' hands President McLeod, in reorganizing the system, appointed Mr. Eddy Second Vice-President. He had general supervision of the traffic department and all its branches. When Mr. Harris became President of the company, Mr. Eddy resigned with the other Vice-Presidents.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio Southwestern.—The car and engine shops at Chillicothe, O., have been consolidated and Master Mechanic John Neuffer given jurisdiction over all, with T. G. Dungan, formerly Master Car Builder as General Foreman.

Cambridge & Chesapeake.—Dr. Elias Jones has been elected President of this Maryland company in the place of his son, Dr. A. C. Jones, recently deceased.

Chicago, Burlington & Quincy.—Gilbert H. Harris, who has been for 16 years connected with the passenger department, has been appointed City Passenger and Ticket Agent in Kansas City, to succeed Robert J. Johnson. Mr. Harris was formerly General Agent of the passenger department at St. Joseph, Mo. For the past six months he has been Traveling Passenger Agent with headquarters in St. Louis.

Lehigh Valley.—Vice-President R. H. Sayre has issued an announcement that Theodore Voorhees will continue until further notice to exercise supervision over the operations of the Lehigh Valley system as heretofore during the lease to the Philadelphia & Reading Railroad Company, with the title of Acting General Manager. Reports will be made to him at Lehigh Valley Railroad office, 223 South Third street, Philadelphia.

Marcy.—The Directors of this new Pennsylvania company are Charles P. Matthews, William Matthews, R. J. Matthews, W. W. Watson, Austin Moore and John Devine, Scranton, Pa., and M. S. Kemmerer, of Mauch Chunk, Pa.

Mexican Central.—A. L. Van Antwerp has been appointed Assistant General Freight Agent. Mr. Van Antwerp has been for some years connected with the traffic department of the Atchison, Topeka & Santa Fe.

Mexico, Cuernavaca & Pacific.—W. W. Mayberry, formerly of the Mexican National Railroad, and more recently of the Monterey & Mexican Gulf, has been appointed General Freight and Passenger Agent of the above railroad.

New Brunswick.—The annual meeting of the company was held last week, when the old Board of Directors was re-elected. Later on the directors elected Robert McNeigh, of Montreal, President, and J. Kennedy Tod, of New York, Vice-President.

West Virginia Central & Pittsburgh.—At the annual stockholders' meeting held in Piedmont, W. Va., Aug. 8, Henry G. Davis was re-elected President; Stephen B. Elkins, Vice-President; Maj. E. W. S. Moore, Secretary and Treasurer; T. B. Davis, Stephen B. Elkins, Arthur P. Gorman, T. Edward Hambleton, R. C. Kerens, W. W. Taylor and Maj. Alexander Shaw, Directors. Mr. Shaw, under the decision of the courts, voted his stock cumulatively for himself.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Baltimore & Cumberland.—President H. G. Davis, of the West Virginia Central & Pittsburgh; President Kennedy of the Cumberland Valley road, and Samuel Rea, Assistant to President Roberts of the Pennsylvania, accompanied an inspection party which made a three days' journey last week on horseback and in carriages along the route of this railroad from Hagerstown to Cumberland, Md., a distance of about 80 miles. The engineers have about completed the location of the line between these towns, and the final revisions were

made in some places during the trip of these officers. Most of the work preliminary to actual construction has been finished, but it is undecided when to begin the grading. No contracts have yet been given out, and it may be some time before bids are asked for the work.

Bangor & Aroostook.—The tracklaying on the southern end of the line has now reached a point about 15 miles north of Brownville, Me., where the new road branches off from the Bangor & Piscataquis. A big cut which is being made beyond the present end of the track will delay the tracklaying on the southern section for some time. Beyond the cut, north of Schoodic Lake the roadbed is ready for the track for a considerable distance, and 17 miles north of the lake is on a tangent.

Big Sandy Valley.—The survey of the upper division of this road from White House along the valley of the Big Sandy River in West Virginia to Buffalo Shoals and Paintville is now being made, while the grading of the lower end is well under way.

Cambridge & Chesapeake.—The Commissioners of Dorchester County, Md., have formally voted to subscribe \$75,000 to the capital stock of this railroad. The voting of this sum in aid of the project was made compulsory upon the commissioners by the act under which the company was organized, but the formal action taken by the commissioners will end litigation and it is said will insure the construction of the railroad. It is to extend from Cambridge on the Philadelphia, Wilmington & Baltimore south about 32 miles to a point in the southern part of Dorchester County on Chesapeake Bay. Elisha Jones, of Cambridge, is President.

Cleveland, Lorain & Wheeling.—The company is making improvements on its river division between Bridgeport and Martin's Ferry, O. Most of this section of the line is built on piling and the improvements include the filling in of this work and the building of stone retaining walls. It is quite an expensive piece of work, the walls being from 10 to 40 ft. in height all the way.

Coal River & St. Albans.—A charter was issued to this company in West Virginia last week for the purpose of building a road from St. Albans, on the Chesapeake & Ohio, and the Kanawha River in Kanawha County, W. Va., along Coal River to Boone C. H., Boone County. The incorporators are M. P. O'Hearn, W. S. Laidly, J. H. Hunt, A. Burlew, J. B. C. Drew, all of Charleston, W. Va. Surveys of the line and examinations of the coal and timber have been made by eastern capitalists.

Columbus, Hocking Valley & Toledo.—This road's new double track iron and steel bridge over the Olenatany River at Columbus has just been completed and the connection thus made with its double track from Valley Crossing (where the Norfolk & Western intersects) seven miles south of the city to a station four miles north of Columbus.

Duquoin & Murphysboro.—The Chief Engineer of this railroad, Walter S. Hawkes, of Duquoin, Ill., has completed the location of the line for about five miles from that town on the northern end and has made the preliminary survey for about five miles further. The company was incorporated a few months ago to build a line from Duquoin southwest to Murphysboro about 20 miles. The principal object is to reach valuable coal mines and the 12 or 15 miles to these mines will be built first. The building of this part of the line will bring it to a connection with the Mobile & Ohio north of Murphysboro. The other railroad connections will be the Illinois Central at Duquoin and the St. Louis & Cairo Short Line nine miles from that town. D. Onstott is President, F. T. Fallon, Secretary, and W. S. Hawkes, Chief Engineer, all of Duquoin, Ill.

George's Valley.—This railroad is being built from Warren station north, to Union, Me., on the Maine Central, and the road will be ready for the shipment of freight from the lime kilns at Warren next week. The distance between the two towns is eight miles, and it is proposed to extend the line about 15 miles further next year. The entire work has been done by James Mitchell, of West Warren.

Gulf, Beaumont & Kansas City.—The grading north of Beaumont, Tex. is reported completed for the first 25 miles from that town, and the tracklaying has now been begun, and about six miles of rails have been laid so far.

Holly River Lumber Company.—This company has about completed the surveys for the road it proposes to build from the West Virginia Central & Pittsburgh Railroad, where that line crosses Elk River, up Elk River for 17 miles to a point where it has located a new town called Byrne, and where its timbering operations will be carried on. The actual work of construction will soon be under way. The right of way is being secured and the contract for the building of the line will be let at an early day. It is desired to complete the road as early in the winter as possible and it will be operated by the West Virginia & Pittsburgh when completed.

Marcy.—A charter was issued to this company at Harrisburg, on Aug. 3. The proposed route of the line is from Elmwood Colliery to a point near the borough of Pittston, all in Luzerne County, Pa. The capital stock is \$10,000, and the president of the company is Charles P. Matthews, of Scranton, Pa.

Minneapolis, St. Paul & Sault Ste. Marie.—Announcement is made that the extension now in process of construction to Sterling, about 52 miles from Minot, N. D., is now within 23 miles of its terminal point, at the boundary line between the United States and Canada. It is expected that the new line will be finished by Aug. 25, to the connection with the extension of the Canadian Pacific.

Nashville Terminal.—The company has been chartered to secure right of way in the city of Nashville for the Nashville & Knoxville and to build a terminal station. J. Baxter is the chief projector.

New Roads.—McSweeney Bros., of Houston, Tex., the contractors who are building the road from Sugarland to Arcola Junction, Tex., a distance of 15 miles, report that work has been commenced and the grading is being pushed with a full force. The road will be built to Duke's, on the Gulf, Colorado & Santa Fe, and then a spur will be built to Arcola. This will give connection with both the Santa Fe and the International & Great Northern and make direct routes to Galveston and Velasco. The road will be completed in three months.

Philadelphia & Reading.—Kearns & Egan have been awarded the contract for building a branch to the Reading colliery just completed at Silver Creek, Schuylkill County, Pa. The work will cost about \$20,000.

Pittsburgh & Lake Erie.—The Elwell Run branch of the Pittsburgh, McKeesport & Youghiogheny starting at Whittett, Pa., and extending to Newmeyer's coke ovens, five miles, will be completed ready for track by Sept. 10. Drake, Stratton & Co., Ltd., are the contractors. About two miles of track is now laid. There are five crossings of Elwell Run, two on iron viaducts, 90 and 150 ft. long, one on an embankment which acts as a dam to make a reservoir for furnishing the main line with water, and two 20-ft. spans. The Pittsburgh, McKeesport & Youghiogheny Railroad has laid four miles of second track from West Newton north to Douglass within the last two months.

Pittsburgh, Morgantown & Fairmont.—On last Friday articles of agreement were filed in West Virginia whereby the Pittsburgh, Morgantown & Fairmont Railroad of West Virginia and the State Line Railroad of Pennsylvania were merged into one corporation and consolidated under the above name. The President of the new company is Thomas M. King, of the Baltimore & Ohio, and the Secretary and Treasurer is James B. Worthington. Work on the line from Morgantown, W. Va., to the north and from Smithfield, Pa., to the south is progressing, but will be delayed considerably by the Cheat River bridge. It was expected to have this structure completed in time that the road might be opened as soon as tracklaying was completed, about Sept. 1, but the erection of the superstructure of the bridge will delay the opening till November.

Prescott & Arizona Central.—This road, extending from Prescott Junction to Prescott, Ariz., 73 miles in length, was sold at public auction, at Prescott, Ariz., Aug. 5, on a judgment from the court for non-payment of taxes. The purchaser was a representative of the New York directors.

Shade Creek.—This line, which is being built by the Cambria Lumber Company, is now about completed and freight trains have begun running. The railroad connects with the Baltimore & Ohio at Foustwell Station, Pa., 11 miles south of Johnstown and it extends along Shade Creek for about 10 miles, which is the portion now completed. The main business of the road will be in hauling logs and bark, but it is intended to carry such general traffic as may be offered. John W. Morris, of Seanor, Pa., is Superintendent.

Sioux City, Chicago & Baltimore.—The newspaper articles indicating the early construction of this proposed road, we are informed, are wholly unauthorized. No contracts have been let, and it is not probable that the construction of any part of the line can be secured under financial conditions now existing. Aid to the amount of \$400,000 has been voted by the city of Sioux City conditioned upon the construction of 37 miles in 1893. T. P. Gere, of Sioux City, is Vice-President.

Southern Pacific.—The company has discharged 1,000 workmen on the new coast line road between Santa Margarita and San Luis Obispo, in the southern part of California, and practically suspended construction work on the line.

South Florida.—The grading on the High Springs and Dunnellon extension to connect with the Savannah, Florida & Western, is now completed with the exception of about three miles. The track is being laid south from High Springs, Fla., and north from Juliette, Fla., a station on the Silver Springs, Ocala & Gulf from which the extension is being built. This road is now operated as part of the Plant system. The length of line now under construction is about 50 miles and the track has been built except for about 25 miles. The entire contract has been let to Morgan, Reynolds & Walker, of Lakeland, Fla., and the extension is being built under the direction of T. L. Morton, constructing engineer.

Terminal Railroad Association of St. Louis.—The details of the plan for the consolidation of the property of this company and of the St. Louis Merchants' Bridge have been completed. The formal agreements have not yet been signed, but the two properties have been operated in harmony for some months, and, as we have already reported, a closer agreement has been under consideration. The consolidation includes the Eads bridge and tunnel, the new union passenger station, the Merchants' Bridge and its connecting tracks, the elevated railroad, the belt lines on both sides of the Mississippi, and extensive freight terminals. Drexel, Morgan & Co. take, as agents of the Terminal Railroad Association, \$2,000,000 of the Merchants' Bridge bonds, and the Terminal Association guarantees the interest of the balance of the bonded indebtedness on the Merchants' properties, including the elevated and the belt lines.

Yankton, Norfolk & Southwestern.—Over 20 miles of track has already been laid and the work will be finished some time early in September. P. Brennan, of Owatonna, Minn., has the contract for tracklaying. The road is being built from Pierce, opposite Yankton, to Norfolk, 27 miles.

GENERAL RAILROAD NEWS.

Chicago & Northwestern.—The annual report for the year ending May 31 gives the following statement of earnings:

	1893.	1892.	Inc. or dec.
Miles.....	4,273	4,273	
Gross earn.....	\$32,709,717	\$31,422,272	I. \$1,287,475
Oper. expen.....	22,293,153	20,336,438	I. 1,956,715
Net earn.....	\$10,416,593	\$11,085,833	D. \$669,240
Fixed charges.....	\$5,736,683	\$5,735,224	I. \$1,459
Surplus.....	\$4,679,910	\$5,350,609	D. \$670,699
Surplus western lines.....	72,324	1,135	I. 71,189
Land sales.....	446,967	568,752	D. 121,785
Total surplus.....	\$1,392,440	\$1,814,336	D. \$421,896

Passenger earnings increased \$657,550, freight earnings increased \$589,292. The construction account is \$4,827,499. Of this amount new engines and cars called for \$2,285,510 and none of this equipment was for replacements. New second track called for \$1,020,556, new side track, miscellaneous construction not chargeable to operating expenses, \$1,432,728, and new real estate, \$83,702.

In addition to this expense, \$3,287,928 was charged to operating expenses for repairs and renewals of engines and cars, a total outlay in the year of \$5,573,439 for maintenance and enlargement of equipment. For renew-

als and maintenance of track \$3,373,904 was spent, or 17 per cent. more than in the previous year.

Gross earnings per mile were \$7,654, a gain of \$301 in the year, and net earnings were \$2,437 per mile, a decrease of \$156 per mile.

Hutchinson & Southern.—Otto Miller, of Hutchinson, Kan., Superintendent of the road, was appointed Receiver by the United States District Court, at Hutchinson, on Aug. 11. The company has had some trouble over right of way matters in Harper County, Kan., and the county court issued an order to prevent the running of trains south of Anthony to the southern terminus of the road at Cameron near the state line, a distance of 11 miles. The directors then decided to have a Receiver appointed by the United States Court and to have the litigation transferred from the state courts to the federal courts.

Northern Pacific.—The road was placed in the hands of receivers on Aug. 15 by the United States Circuit Court. The receivers are President Thomas F. Oakes, H. C. Rouse, of New York, and H. C. Payne, of Milwaukee. The suit for the appointment of the receivers was brought by the Farmers' Loan and Trust Co. of New York, and others, and was agreed to by the railroad company. The complainant alleged that since last May the company has issued \$10,050,000 collateral trust bonds, \$610,000 in deferred scrip. Its earnings have been falling off for several months, and this, it is explained, is partly due to the decrease in immigration, the depression in business and the stringency in the money market. The floating debt, after the issue of the trust bonds, was reduced to about \$1,000,000. This amount has been borrowed on securities, the petitioners say, the value of which has been declining. Holders of notes have been calling upon the company to make good the margins, the resources of the corporation have been exhausted and it is unable to meet further demands. Next month interest and sinking fund charges will amount to \$393,000; the rental of the Wisconsin Central, \$152,000, will be due, and bills payable will be owing, amounting to \$349,000. On Oct. 1 there will be due for interest on the second mortgage bonds \$1,127,630. On Nov. 1 the interest and sinking fund charges and money due for collateral notes will be \$450,630. Dec. 1 there will be due \$1,506,701. It is set forth in the petition that unless the company be put into the hands of receivers, there will be hundreds of suits brought, as the corporation is now running behind and not able from its revenue to meet fixed charges.

In the answer to the complaint the company admits all the charges of the petitioners. It says the earnings have been falling off, the fixed charges and operating expenses exceed the gross earnings, and that it will be unable to carry out the funding scheme set out in its collateral trust indentures of May 1, 1893.

Vice-President Williams issued the following statement on Tuesday:

"In consequence of the extraordinary depression of business and the stoppage of shipments along its line, the Northern Pacific Railroad Company has been forced to acquiesce in an application for the appointment of receivers. No company could long stand such severe pressure. The falling off in earnings is owing to several causes. The money stringency prevents the marketing of crops, cattle and products of all kinds; consequently the road is not getting the traffic usual to this season of the year. The failures of banks have tied up money upon which we depended for cash. The depression prevailing over the whole country has been exceptionally severe in the younger States, so that general business along our main and branch lines has been practically at a standstill. Payment of bond interest under such circumstances could have been carried out only by borrowing money and increasing the floating debt, which would have entailed heavy sacrifices upon the bond and stockholders of the company. The receivership means, therefore, the preservation of the property and a conservation of all interests until better times."

The gross earnings for July, 1893, are reported as \$2,019,425, these figures being partly estimated; the actual gross earnings in 1892 were \$2,718,285, a decrease of \$698,860.

Toledo, St. Louis & Kansas City.—Messrs. John C. Havemeyer, H. O. Armour, James M. Hartshorne, Otto T. Bannard and Morton S. Paton, the Bondholders' Committee of the company, give notice that holders of bonds to the amount of nearly \$3,000,000 have signed the bondholders' agreement.

Union Pacific.—The earnings for the entire system for June are reported in the following table:

	1893.	1892.	Inc. or dec.
Gross earn.....	\$3,344,687	\$3,920,412	D. \$575,725
Oper. expen.....	2,258,937	2,256,195	I. 2,772
Net earn.....	\$1,085,720	\$1,664,217	D. \$578,497
Six months to June 30.			
Gross earn.....	\$19,193,310	\$19,978,273	D. \$784,963
Oper. expen.....	13,676,506	13,494,505	I. 182,001
Net earn.....	\$5,517,304	\$6,483,768	D. \$966,464

The earnings for the more important divisions are given below:

Oregon Short Line.			
June gross earn.....	\$610,146	\$664,991	D. \$54,845
Net earn.....	293,707	346,873	D. 53,166
Six months' gross earn.....	3,199,516	3,291,834	D. 92,318
Net earn.....	1,208,193	1,241,118	D. 32,925
Oregon Railway & Navigation.			
June gross earn.....	\$337,961	\$411,633	D. \$73,672
Net earn.....	82,627	163,725	D. 81,098
Six months' gross earn.....	1,855,509	1,960,474	D. 104,965
Net earn.....	339,918	356,396	D. 16,468
Union Pacific, Denver & Gulf.			
June gross earn.....	\$141,825	\$19,002	D. \$77,177
Net earn.....	65,684	155,475	D. 89,791
Six months' gross earn.....	2,750,839	2,718,919	I. 31,920
Net earn.....	521,443	539,778	D. 18,335

Union Pacific, Denver & Gulf.—Ex-Governor John Evans filed a petition in the District Court at Denver, Col., on Aug. 11, asking that a receiver be appointed for this railroad. The receivership is asked for on the ground that the road has been operated to the advantage of the Union Pacific system and against its own individual interests, contrary to the conditions and agreement entered into when the road was turned over to the control of the Union Pacific. The road was formerly known as the Denver, Texas & Fort Worth, and was controlled by Ex-Governor Evans, and he claims that when it was leased to the Union Pacific it was promised that the Denver, Texas & Gulf road should be operated independently. The hearing has been set for Sept. 4, in Denver.

TRAFFIC.

Traffic Notes.

The passenger agents in Los Angeles, Cal., have organized the "Southern California Local Passenger Association."

Congressmen who devote their spare time to considering the evils of Canadian railroad competition are again active, and threaten to introduce several bills in the present Congress touching their favorite theme; and the "literary bureau," which acts as a department of publicity and promotion on this subject, seems to be equally active.

A Boston dispatch states that the vessels carrying coal from Philadelphia, Norfolk and other ports to New England have gone down about to cost, and that a conference is to be held to consider the advisability of an agreement to tie up some of the vessels part of the time.

The Dominion Millers' Association had its annual meeting in Toronto, Ont., last week, and passed resolutions expressing the wish that underbidding of freight should be made a penal offense in Canada, as it is in the United States. The millers want the railroad companies to procure the necessary legislation, and offer to assist them, but they will appeal to Parliament themselves if the railroads do not move in the matter.

In a question concerning prepayment of freight charges as now required by the Williamsville, Greenville & Northwestern, the St. Louis, Iron Mountain & Southern and the St. Louis, Cape Girardeau & Fort Smith railroads, and by the Pacific Express Company, the Railroad Commissioners of Missouri have decided that such prepayment cannot be required. The collection of freight charges must follow the delivery of freight at destination.

Chicago Traffic Matters.

CHICAGO, Aug. 16, 1893.

The General Managers of Central Traffic Association roads at their meeting on Aug. 10 voted to restore all World's Fair excursion rates in the territory of that association to the schedule agreed upon April 10, to take effect Aug. 21. Exception is made in the rates from Ohio River and Columbus Territory, which are to be as follows, to Chicago and return:

From.	Limit.
Cincinnati and Louisville, Nov. 5.....	\$12.00
10 days, inc. date of sale.....	9.00
Special day-car excursion.....	7.00
Columbus, O., Nov. 5.....	12.50
10 days.....	10.00
Special day-car excursion.....	7.50
Dayton, O., Nov. 5.....	11.50
10 days.....	9.00
Special day-car excursion.....	7.00

It was agreed to continue in effect until Aug. 21 the reduced rates authorized July 27, to expire Aug. 10. It is to be the policy of the roads to run the special excursions from any point whenever enough passengers can be secured from the starting point and intermediate points to make up a train load.

There was a threatened break in Western World's Fair rates last week, caused by a complaint of the Chicago, Rock Island & Pacific that the Burlington lines were advertising at Omaha and elsewhere excursion rates at fare-one-way, no mention being made of the agreed addition of \$2. A meeting of the Western Passenger Association was held Aug. 12, at which the representative of the Burlington claimed that the posters in question were at fault through an error of the printers. The Rock Island accepted the explanation and withdrew its demand for one-way rates, on the assurance of the Burlington that the misleading posters would be at once "pasted out."

Chairman Midgley, of the Western Freight Association, is inclined to take vigorous measures to stop the practice of issuing advance bills of lading, and urges the assembling of the Association lines at an early date to take action in the matter, especially concerning the practice at Kansas City.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending Aug. 12 amounted to 52,042 tons, against 48,898 tons during the preceding week, an increase of 2,144 tons, and against 47,366 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	Wk to Aug. 12		Wk to Aug. 5.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	6,597	12.6	5,324	10.7
Wabash.....	4,516	8.7	4,867	9.7
Lake Shore & Michigan South.....	7,266	14.0	8,580	17.2
Pitts., Ft. Wayne & Chicago.....	8,087	15.5	6,371	12.8
Pitts., Cin., Chicago & St. Louis.....	6,625	12.7	5,513	11.1
Baltimore & Ohio.....	2,551	4.9	2,736	5.5
Chicago & Grand Trunk.....	3,599	6.8	3,082	6.2
New York, Chic. & St. Louis.....	4,324	8.3	4,211	8.4
Chicago & Erie.....	6,892	13.3	7,190	14.4
C., C. & St. Louis.....	1,675	3.2	2,024	4.0
Totals.....	52,042	100.0	49,898	100.0

Of the above shipments 1,163 tons were flour, 17,678 tons grain and millstuff, 11,136 tons cured meats, 11,648 tons dressed beef, 1,559 tons butter, 1,714 tons hides and 4,808 tons lumber. The three Vanderbilt lines carried 36.9 per cent., the two Pennsylvania lines 28.2 per cent. The Lake lines carried 77,883 tons, against 84,262 tons during the preceding week, a decrease of 6,379 tons.

(Other Chicago traffic news will be found on page 624.)

Anthracite Coal Trade.

The anthracite producing interest, having awakened to the importance of restricting the weekly output of coal more closely to the quota agreed upon, find the result in an improving and steadier market. There is a better inquiry for coal for future delivery, and dealers who have withheld from stocking their bins in the hope that the necessities of the Reading and Lehigh companies would force them to sacrifice coal, and thus cheapen that commodity, will be disappointed. The Lehigh Valley has assumed until Sept. 1 the contracts of the Reading to purchase the output of the individual collieries on the lines of the Lehigh company.

The total amount of anthracite coal sent to market for the week ending Aug. 5 was 770,411 tons, and for the year to that date the total tonnage has been 24,976,527 tons, compared with 23,771,909 tons in the corresponding period of 1892.

At Port Richmond freights are nominally quoted at 60¢ to 75¢, and discharge to Boston and 55¢ to 65¢. to Providence.—Philadelphia Public Ledger.